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BREECH PRESENTATION

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This malpresentation, which occurs in approximately 3% of cases at term, is associated with a high foetal mortality, a raised maternal mortality and morbidity, and a greater incidence of maternal trauma. Gibberd says of it that 'the gross foetal mortality in hospital practice is seldom below 30% and often above this figure'. For these reasons breech presentation should never be regarded lightly.

There are a number of conditions which are known to occur in association with breech presentation and which may be aetiologically related to the occurrence of this malpresentation. These may be grouped under several headings, as follows:

1. Conditions interfering with the proper adaptation of the foetal head to the lower uterine segment or of the breech to the fundus. This group includes placenta praevia, contracted pelvis, hydrocephalus, tumours of the uterus or pelvic structures, cornual attachment of the placenta, and congenital abnormalities of the uterus such as subseptate uterus.

2. Conditions providing excessive room in which the foetus can move. Here are included hydramnios, multiparity with slack uterus, multiple pregnancy (frequently associated with hydramnios), and prematurity (relatively larger amount of liquor).

3. Conditions providing too little space for free movement of the the foetus, such as oligohydramnios and extended legs.

It must be mentioned that in a large proportion of cases no apparent 'cause' can be detected.

Depending on the attitude of the legs several varieties of breech presentation are described, as follows:

(*a*) Complete, where both hip and knee joints are flexed, and

(*b*) Incomplete, when one or other or both these joints are extended. There are thus three sub-groups of incomplete breech presentation:

(i) Extended or frank breech, where the hips are flexed and the knees extended,

(ii) Knee presentation, where the hips are extended and the knees flexed,

(iii) Footling presentation, where both hips and knee joints are extended.

Diagnosis is of vital importance for, as I shall indicate later, early diagnosis will improve the results. Suspicion should be aroused by the presence of epigastric discomfort or tenderness, the sensation of a lump in the upper abdomen, the sudden onset of nausea or heartburn, or the feeling of excessive movements over the bladder or in the vagina. Palpation will as a rule provide the answer by feeling the head in the fundus and the breech in the lower pole of the uterus. The position of the foetal heart, though not of great diagnostic value, may help to confirm these findings. Where difficulty arises from obesity, resistance or an irritable uterus, or because the head is situated deeply under the costal margin, a vaginal examination, even with closed cervix and intact membranes, may be of considerable value in arriving at a diagnosis. If, after this, there still remains any doubt, resort should be made to radiological examination.

MANAGEMENT

Once the malpresentation is recognized the problem of its management then arises. In the first instance it is necessary to decide whether breech presentation adds materially to the risks. To assess this adequately it is necessary to compare the gross foetal mortality rates of breech and vertex deliveries. Gibberd's figure of a 30% and higher foetal mortality with breech delivery should convince the most sceptical. I am certain that the practice of correcting results by excluding complications is wrong. Thus to exclude prematurity when assessing the foetal risk of breech presentation is misleading because I am sure that in many of these cases it is the breech presentation *per se* that is responsible for the premature rupture of membranes and the onset of premature labour—I hope at some future date to prove this statement. Further, the tendency to exclude the cases delivered by Caesarean section when considering the foetal risk of breech delivery completely omits the risks to the mother, immediate and late, of Caesarean section, as well as the likely diminution in the size of the family following Caesarean section.

The answer to the problem is to prevent breech presentation by prophylactic external cephalic version. In spite of the dangers attributed to this procedure the risks to the foetus of a breech delivery are far greater. Before considering the technique I must first stress the contra-indications. Thus, version should not be performed in the following conditions: Where delivery by Caesarean section is already indicated for some other condition; in the presence of toxaemia or hypertension (because of the added risk of traumatic accidental haemorrhage); in cases of hydrocephalus (which are more readily dealt with when the breech presents); in cases of antepartum haemorrhage; and in multiple pregnancy. Previous Caesarean section constitutes a relative contra-indication.

External Cephalic Version

In the absence of any of these complications external cephalic version should always be attempted. The first decision that has to be made is, when should version be first attempted? Here, as elsewhere, it is unwise to generalize. Each case needs to be judged on its own merits. In patients with a relaxed thin abdominal wall, a slack uterus, and a fair

amount of liquor, version can well be delayed till the 34th week, or on occasion even later. On the other hand, where it is anticipated that version is likely to prove difficult, as when the amount of liquor is minimal or the legs are extended, version should be performed very much sooner if success is to be achieved. I have in such cases performed the operation as early as the 24th week. To judge which cases fall into this latter category is not difficult and such judgment is readily gained by experience.

Having then decided when to do the version, the direction of turning the infant must next be considered. In the majority of cases the direction of turning is unimportant, provided that if version fails in one direction, an attempt is made to turn the foetus in the opposite direction. However, there is one type of case in which I feel the direction of turning is important, viz. the breech with extended legs. Here the foetus should be turned so that it does a backward somersault. Not only is the version more likely to succeed but by turning it in this direction the legs are more likely to flex, particularly if the abdominal hand can be insinuated between the sinciput and the feet. This is provided that the legs cannot be first flexed by abdominal manipulation, as on occasion they can be.

The essential requirements for successful version are relaxation on the part of the patient, and gentleness and patience on the part of the operator. The latter are particularly important and will result in a higher incidence of success. In the majority of patients a preliminary explanation is advisable, but on rare occasions it is best avoided. The patient should be lying flat on her back in a position of comfort. I have not found the Trendelenberg position particularly valuable, even in the difficult cases. Bending the knees may occasionally be of some assistance in improving the abdominal relaxation.

After the position of the foetus has been determined and the foetal heart listened to, the breech should first be 'disengaged', then displaced towards one or other iliac fossa, and held there with one hand, while with the other hand the head is gently pushed round towards the pelvis. Continued pressure (continuous or intermittent as the case demands) with both hands will generally succeed in converting the presentation to a vertex. While this procedure will succeed in the majority of cases it is necessary on occasion to vary the technique slightly. Thus, frequently it is only necessary to apply pressure on one pole and, as the foetus moves away from the operator's hand, the hand is advanced so that the foetus virtually turns on its own in its attempt to evade the pressure. Occasionally, too, difficulty is caused by the head impinging on the iliac crest, when success may be achieved by pushing the head downwards and forward by additional pressure from the loin. I repeat, too, that in some cases extended legs can be flexed by external manipulation before version is performed. On rare occasions it may be necessary to elevate the breech from the pelvis by vaginal manipulation.

After successful version it is generally advised that the head should be pushed into the brim, though I personally doubt the value of this additional procedure. Certainly the foetal heart should be checked and the vulva inspected for bleeding after each attempt at version. The foetal heart usually slows after the procedure but rapidly returns to normal. Should it fail to do so it might be wise to reconvert the presentation to a breech. I have not yet had to do so, for the necessity for this very rarely arises. The bleeding that occasionally follows version is caused by placental separation, but it is usually slight and generally subsides quickly with bed rest. Provided version is avoided in cases of toxaemia and hypertension the risk of a severe accidental haemorrhage is very small indeed. After a successful version I do not use and would not recommend the use of any abdominal pad or binder.

Should the first attempt at version fail, repeat attempts should be made one or two weeks later, depending on the stage of pregnancy. If version has not been successfully accomplished by the 34th week, an attempt should be made under anaesthesia. Provided the necessity for gentleness is borne in mind and undue force is avoided there is no contra-indication to anaesthesia. For this particular operation I still have a preference for chloroform anaesthesia; this will produce more uterine relaxation than other anaesthetic agents, in consequence of which the version will be easier, it will be less necessary to use force, and complications will be less likely.

With the above technique, it is possible to achieve anything from 97 to 99% success and so considerably lower the incidence of breech presentation at delivery.

What of the *complications* of external cephalic version? The text-books list a number of serious and frightening complications without placing them in their proper perspective. Let me consider them each in turn:

Premature rupture of membranes, with or without premature labour. Needless to say, if this occurred before the 36th week it would constitute a serious risk; but in practice it very rarely happens and the earlier in pregnancy version is performed the less likely it is to happen.

Accidental haemorrhage from traumatic separation of the placenta. When this occurs the bleeding is as a rule slight and settles down rapidly with rest in bed without any harm resulting to the foetus. The risk of serious haemorrhage or extensive placental separation is reduced to a minimum by avoiding the operation in the presence of toxaemia or hypertension.

Presentation of the cord. Though listed as a complication of version it should very definitely be excluded because, far from causing a presentation of the cord, version will in fact reduce the incidence of presentation and prolapse of the cord by removing the cause, which is the malpresentation.

Tying a knot in the cord. Though theoretically possible it must be so difficult to do that it could well be excluded from the list of complications.

Rupturing the uterus. This is a frightening possibility but one that can readily be obviated by not using excessive force and by avoiding version when there is any doubt about the state of any uterine scar. With a healthy uterus the possibility of rupturing the uterus is virtually non-existent.

Intra-uterine foetal death by traction on a cord which is too short or shortened from being wound round the neck or trunk of the foetus. This again is a very unlikely possibility, the short cord being more likely to result in failure of version than in foetal death.

Persistence of extended legs. This may constitute a serious risk where the extended legs may cause obstruction during labour by being held up in the iliac fossa, preventing descent of the head. Fortunately this is not a common complication, but it needs to be borne in mind. In most cases the legs

flex during version, or in some cases it may be possible to flex the legs before, or on occasion after, a successful version.

The conclusions to be drawn from the above remarks are that version is a relatively simple procedure, that the complications are rarely seen, and that the earlier in pregnancy the version is performed the easier the version, the less the force that needs to be applied, and consequently the fewer the complications. There are two objections that are constantly raised to early version and these need to be dealt with. It is said that if left alone some of these cases will turn spontaneously. While this is perfectly true, no harm will result from doing what nature would have done anyhow, and by doing early version one will succeed in turning those cases where nature would have failed and where if delayed to much later in pregnancy the doctor will also fail—the result being a 30% or higher gross foetal mortality! The second objection to early version is that the foetus might revert to a breech, necessitating repeat version. Personally I am never disturbed by this. My attitude to this possibility is that, should the foetus find it easy to move round to a breech, cephalic version will also be easy and the possibility of any complication resulting from repeat version is therefore negligible. At least those cases which provide difficulty in version will be less likely to revert to a breech and they will thus have been successfully turned, whereas if left to a later stage of pregnancy the difficulties will be greater or even insuperable. Further, the common causes of failure in performing version, such as scanty liquor, sacro-posterior position, extended legs and a head that is situated deeply under the costal margin, are all usually avoided or overcome by early version.

Though I have stressed the advisability of early version, I must add that no matter how late in pregnancy a breech presentation is discovered external version should still be attempted and if necessary under general anaesthesia. It may sometimes be a reasonable procedure even during labour before the membranes have ruptured.

The Unconverted Breech Presentation

It is necessary now to consider the management of those cases of breech presentation where prophylactic treatment has failed, of the few cases where the diagnosis has not previously been made, and of the cases of breech presentation seen as emergencies in labour. The choice of treatment here lies between Caesarean section and vaginal delivery. Caesarean section is best employed where some complicating factor exists. Thus it would be indicated in the elderly primigravida, in patients with pelvic contraction, and in cases where the foetus is clinically considered to be large. Vaginal delivery on the other hand would be confined to those cases presenting no such additional complications. Premature induction of labour in breech presentation is best avoided, for the risk of intracranial damage is so much greater for the premature than the mature foetus.

Let us now consider the management of normal labour in the uncomplicated complete breech. During the first stage of labour the management is the same as for a vertex presentation. However, as with any other malpresentation, there is a greater risk of premature rupture of the membranes and of prolapse of the umbilical cord. This complication must constantly be looked for and, should it occur, dealt with on its own merits. As soon as the perineum commences to bulge the patient should be placed in the lithotomy position with her buttocks at the edge of the bed. When the perineum is distended an episiotomy should be performed. This should be a liberal one and should be done under local anaesthesia (local infiltration or pudendal block). It should be done in all primigravidae and in those multiparae where it is apparent that the perineum will offer an unnecessary additional risk to the foetus.

With continued expulsive efforts on the part of the mother, further descent of the foetus occurs and the legs may, without traction, be lifted out of the vagina. When the umbilicus appears a loop of cord is pulled down to avoid traction on the umbilical insertion of the cord. With further descent the arms appear and these, too, may be lifted out of the vagina. The shoulders now escape and we are left with the aftercoming head, which may be delivered by several methods. This is the most critical stage in a breech delivery and the one which either kills or saves the foetus. Undue haste at this stage must be avoided, for fear of intracranial trauma or injury to the spinal column.

Before considering the methods of delivering the aftercoming head, it will be pertinent to review briefly the mechanism of labour in breech presentation. The movements involved in a breech delivery are engagement, descent, internal rotation (whether anterior or posterior is immaterial in breech presentation), lateral flexion of the foetal spine, and the movements of the head through the pelvis. The movements of the head through the pelvis are in turn engagement, descent, internal rotation and flexion; they are not generally appreciated in relation to the delivery of the aftercoming head, but it is particularly important to bear them in mind if it becomes necessary for the accoucheur to assist the delivery of the head throughout the pelvis.

The method which is best tried first is the Burns-Marshall method. This consists of allowing the trunk to hang from the vulva for half a minute, the object being to enable the traction supplied by the weight of the foetal trunk to pull the head through the brim and pelvis, promote flexion, and cause internal rotation. The operator stands with his side towards the patient, grasps the feet with the hand furthest from the patient and applies traction downwards towards the floor. Should the nape of the neck appear under the symphysis pubis the accoucheur may continue with the method. If the head does not descend adequately it can often be induced to do so by suprapubic pressure with the other hand whilst downward traction on the feet is continued. To continue with the delivery, slowly raise the feet through 180° *applying traction all the time*. As soon as the mouth escapes over the perineum the airway should be cleared and the delivery of the head completed. This is conveniently achieved by now grasping and applying traction on the feet with the hand nearest the patient and using the other hand to control the exit of the head from the vulva, taking the utmost care to prevent its too rapid expulsion.

Should the head not enter the brim with combined traction on the feet and suprapubic pressure on the head in the axis of the pelvic brim, then the Mauriceau-Smellie-Veit, or jaw-flexion shoulder-traction, method of delivering the aftercoming head should be employed. Although details of the method will be familiar to readers I should like to stress the necessity, during the extraction, of recalling the movements of the head through the pelvis in the normal mechanism.

Thus the head should be brought through the pelvic inlet with the sagittal suture in the transverse diameter and, after traction has brought the head to the level of the pelvic floor, the head should be rotated so that the occiput lies anteriorly. As in the Burns manœuvre, the same precautions should be employed to prevent the too rapid extrusion of the head from the vulva.

A third method of delivering the aftercoming head is by forceps. This is an extremely valuable method and should be employed as soon as any difficulty is encountered with the above methods. For this reason forceps should always be at hand whenever a breech delivery is being conducted.

Complications

It remains now to deal with some of the complications of breech delivery:

1. *Extended legs.* This does not constitute a real complication; it should be treated as one would a complete breech. When the legs are born as far as the knees, they may be lifted out of the vagina. Should this prove difficult, Pinard's manœuvre, which consists of abducting the thigh and increasing its flexion by pressure in the popliteal fossa will produce flexion of the leg, making the foot more readily accessible. The only other feature of this complication that must be borne in mind is the frequent co-existence of extended arms.

2. *Extended arms.* This may be present *ab initio* or may result from traction on the breech. Where this complication occurs the arms need to be extracted before delivery of the head can be effected. An ingenious method of so doing was described by Lovset in 1937. Sufficient traction is employed to bring the posterior shoulder below the sacral promontory. Then, during continued traction, the trunk is rotated through 180° to bring the posterior shoulder under the symphysis pubis, when the arm can easily be reached and brought down. The direction of turning is such as to bring the posterior arm across the face during the rotation. The trunk is then again rotated in the opposite direction through 180° and the other arm similarly brought down. If this manœuvre fails, the arms may be brought down by the older method of inserting the hand into the vagina and bringing down first the posterior and then the anterior arm. For the latter, rotation into the posterior position may be required.

3. *Arrested breech.* This refers to the breech arrested at the pelvic brim. The usual cause for this is disproportion and the problem is best solved by Caesarean section.

4. *Impacted breech.* Here the breech is impacted in the pelvic cavity. The cause is usually disproportion and the best treatment is probably Caesarean section. If the breech is low in the pelvic cavity, groin traction or bringing down a leg may be indicated.

5. *Posterior rotation of the occiput.* First an attempt should be made to rotate the occiput to the front. Where rotation is not possible the chin and face should be delivered from under the symphysis pubis by carrying the trunk backwards. When the forehead is fixed under the symphysis, the trunk is carried forwards to deliver the occiput over the perineum.

6. *Arrest of the head by an incompletely dilated cervix.* This dangerous complication is more likely to occur with a premature breech delivery. It is fortunately not common but carries a high foetal mortality. The only hope of saving the foetus is by incision of the cervix with extraction of the head.

SUMMARY

Although the title of this paper is breech presentation, a large part has been directed to discussing the ways and means of preventing this malpresentation. With adequate antenatal care and the employment of antenatal prophylactic version it should be possible almost completely to eliminate breech presentation.

As, however, the occasional necessity for breech delivery will always arise, the methods of coping with this malpresentation and its complications have been discussed. Particular stress must be laid on:

1. The high foetal and neonatal mortality with breech delivery.

2. The value of prophylactic external cephalic version.

3. The importance of patience, experience and forceps in the delivery of the aftercoming head.

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EDITORIAL : VAN DIE REDAKSIE

RECENT PROGRESS IN ALDOSTERONE RESEARCH

The sodium-retaining action of aldosterone is now well known and its importance in the homeostatic regulation of electrolyte and, indirectly, fluid balance has been clearly demonstrated. However, there are still many problems to be solved and it appears that the answers will not be long delayed, judging from the intense research activity in this field.

One of the main problems upon which some light has recently been shed, is the mechanism by which aldosterone secretion of the adrenal is initiated. Denton *et al.*,[1] in a neat series of experiments, showed that the denervated transplanted adrenal can adequately secrete aldosterone. The conclusion to be drawn from this work is that the stimulus to the adrenal must be on a humoral basis, especially because in cross-circulation experiments the transplanted adrenal responded equally well. The identity of the hormone responsible is unknown and other work has shown that it is not ACTH.[2] The site of production of the hormone is also unknown, although there is some very good evidence that the centre which controls its secretion is probably situated in the region of the pineal and the subcommisural body in the diencephalon.[3]

The stimuli affecting the central receptor have been demonstrated to be changes in extracellular volume.[4] Experiments illustrating the part played by the vagus in transmission of stimuli set up by volume changes are of great interest.[5] Constriction of the inferior vena cava (which locally reduces intravascular volume) produces an increase of aldosterone, whether the vagus is sectioned or not. But when the constriction is released, the aldosterone level does not fall unless the vagus is intact. It appears, then, that the stimulus for the increase in aldosterone level is independent of the vagus and is transmitted by other pathways, but this is not the case in decrease in the aldosterone level.

Another well-known fact is that urinary aldosterone is increased in amount in oedematous states. It is presumed, therefore, that aldosterone is directly implicated in the production of oedema. However, the fact that there is no oedema in some cases of aldosterone-secreting tumour (Conn's syndrome) raises a serious difficulty. To complicate matters further, it has been clearly shown that some patients with gross oedema due to congestive cardiac failure have low aldosterone levels in the urine.[6] Explanations offered as a solution to these problems do not appear to be very convincing. It is predicted that a further search in the 'amorphous fraction' of adrenal secretion may yield more hormones of vital importance which, together with aldosterone, influence electrolyte metabolism.

From the practical point of view, two substances which antagonize aldosterone, and hence diuretic properties, have been under investigation. Amphenone and derivatives act directly on adrenal steroidogenesis, reducing, among other hormones, the output of aldosterone.[7] The toxicity of this compound, however, precludes its general usefulness. The spirolactones, which are also steroid compounds, appear to produce their effects by blocking the sodium-retaining action of aldosterone and DOCA on the renal tubules.[8] Although the application of these substances is still very much in the experimental stage, the work provides some indication of the direction in which diuretic therapy of the future is progressing.

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DIE KOSTE VAN MEDIESE DIENSTE

Die Minister van Gesondheid het onlangs besluit om 'n kommissie aan te stel met die opdrag om die hoë koste van mediese dienste en medisyne in Suid-Afrika te ondersoek, en om aanbevelings te maak oor hoe hierdie koste verlaag kan word.

Die lede van die Kommissie bestaan uit prof. H. W. Snyman, dekaan van die Fakulteit van Geneeskunde van die Universiteit van Pretoria (voorsitter); dr. R. S. Verster van Bloemfontein; prof. J. N. de Villiers van die Universiteit van Stellenbosch; prof. D. G. Steyn van die Universiteit van Pretoria; dr. I. J. Louw van die Transvaalse Provinsiale Administrasie; dr. A. W. Lategan, direkteur van die Buro van Standaarde; dr. M. D. Marais, ekonomiese raadgewer van Sanlam; mev. J. A. Mostert; mnr. O. H. B. Attwell, gewese hooflanddros in Durban; en mnre. N. Hall en G. R. Kempff van die Departement Gesondheid (sekretarisse). Die aanstelling van hierdie Kommissie sal groot belangstelling wek by lede van die mediese professie, verteenwoordigers van die farmaseutiese firmas, sowel as by lede van die algemene publiek.

Die stygende koste van mediese dienste, insluitende die koste van medisyne, is maar een faset van die spiraal van stygende lewenskoste in die algemeen, en dit is 'n wêreldwye probleem. Soos bekend het verskeie oorsese lande orals oor die wêreld elkeen op sy eie manier sy eie oplossing vir hierdie probleem gesoek. Ons eie pogings in hierdie land om die probleem van stygende mediese koste die hoof te probeer bied, sluit onder andere in die ontwikkeling van verskeie stelsels van vrye of gedeeltelik-vrye hospitaaldienste; 'n uitgebreide stelsel van mediese bystandsverenigings; 'n stelsel van goedgekeurde mediese hulpverenigings aan wie se lede kragtens 'n ooreenkoms met die Mediese Vereniging van Suid-Afrika 'n voorkeurtarief toegestaan word; mediese versekeringskemas wat deur versekeringsmaatskappye beheer word—oor die beleid en optrede waarvan daar tans nog groot verskil van mening sowel as onte-

vredenheid bestaan; en 'n Mediese Diensplan—'n versekeringsmaatskappy wat deur dokters self op 'n nie-profyt-basis gedryf word en wat die ondersteuning van die Mediese Vereniging geniet.

Oor al hierdie pogings en ondernemings en oor baie meer sal die Kommissie hulle moet uitspreek. Dat die Kommissie voor 'n moeilike en delikate taak staan, ly geen twyfel nie. Om hierdie rede wil ons graag 'n dringende beroep doen op alle belanghebbende partye om hulle volle steun en medewerking aan hierdie Kommissie toe te sê en om alle moontlike informasie wat van belang mag wees aan die Kommissie voor te lê. Die besluite van hierdie Kommissie en die aanbevelinge wat hulle sal maak, sal sonder twyfel 'n diepgaande uitwerking hê op die hele toekomstige verloop en struktuur van mediese dienste in ons land.

THE COST OF MEDICAL SERVICES

The Minister of Health has recently appointed a commission to investigate all the factors responsible for the high cost of medical services and medicines in South Africa and to make recommendations on how this could be reduced.

The members of the commission are: Prof. H. W. Snyman, Dean of the Faculty of Medicine at the University of Pretoria (chairman); Dr. R. S. Verster, of Bloemfontein; Prof. J. N. de Villiers, of the University of Stellenbosch; Prof. D. G. Steyn, of the University of Pretoria; Dr. I. J. Louw, of the Transvaal Provincial Administration; Dr. A. W. Lategan, Director of the Bureau of Standards; Dr. M. D. Marais, economic adviser to Sanlam; Mrs. J. A. Mostert; Mr. O. H. B. Attwell, former Chief Magistrate of Durban; Mr. N. Hall and Mr. G. R. Kempff, of the Department of Health (secretaries). The appointment of this Commission will arouse the interest of members of the medical profession, and representatives of the pharmaceutical firms as well as of members of the public.

The rising cost of medical services, including the cost of medicines, is only one facet of the spiral of rising cost of living in general, and it is a world-wide problem. Several overseas countries have, as is well known, each made its own attempt to solve this problem. Our attempts to find a solution include, among others, the development of various systems of free or partly free hospital services; a system of medical benefit societies; a system of approved medical aid societies whose members are, by virtue of an agreement which exists between the societies and the Medical Association of South Africa, entitled to the privilege of a preferential tariff of fees; medical insurance schemes operated by insurance companies—about whose policy there is disagreement and dissatisfaction; and the Medical Services Plan—a medical insurance scheme run by doctors themselves, with the blessing of the Medical Association, on a non-profit basis.

The Commission will have to report on and make recommendations regarding these and many other aspects of the problem under discussion. There is no doubt that the Commission has a difficult and delicate task before them. We should therefore, like to appeal to everybody concerned to cooperate fully in ensuring the success of this inquiry, by submitting every possible item of information for scrutiny and evaluation. The conclusions and recommendations of this commission will almost certainly have a profound effect on the future course and structure of medical practice in this country.

ADRENAL VIRILIZING TUMOUR AND PREGNANCY

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Many cases of adrenal virilism have been described, but the occurrence of a successful pregnancy and the birth of a normal female child in this condition has not been reported.

CASE HISTORY

First Admission

The patient, a White female at that time 32 years old, presented in 1953 at another hospital with a history that during the previous 2 years she had noticed progressive growth of facial hair as well as temporal recession of her scalp hair. Her voice had become 'deeper and masculine'. The menstrual cycle remained regular and normal. She had 2 children (5 and 3 years) both of whom had been breast fed.

The available relevant details of this admission (Table I) show a persistently high 17-ketosteroid excretion. No abnormality was seen on intravenous pyelogram. At laparotomy a wedge of the right ovary was removed, which on histological section showed a normal corpus luteum. Unfortunately there is no record of the adrenal gland having been examined. Post-operatively there was no improvement in the hirsuties; the estimation of the excreted 17-ketosteroids gave a high normal figure.

During the next few years the hirsuties extended to the chest, abdomen and extremities. The menstrual cycle remained normal. Although there was difficulty in becoming pregnant, she gave birth in 1956 to a live premature child, which she breast fed. This pregnancy was complicated by threatened miscarriages.

Second Admission

The patient was referred to the Johannesburg Hospital in 1958 because of a change in her symptoms. She stated that for the previous 7 months she had developed amenorrhoea, severe acne of her body and face, progressive hirsuties, increasing strength and libido, and a gain in weight.

Examination showed a slightly 'moon-faced' young woman with extensive acne of face and body. The scalp hair was thin and dry with marked temporal recession. The facial hair was profuse and dark. The trunk and extremities were hirsute and the pubic hair was of male distribution. The blood pressure was 120/70 mm. Hg. Gynaecological examination showed a markedly enlarged clitoris. The vagina, cervix and uterus were normal. The left ovary was palpable, but not the right. The patient's 2-year-old child was examined and found to have normal external female genitalia.

Special investigations. The results of the steroid investigations are incorporated in Table I. The following laboratory data were also obtained: Haemoglobin, 16 g./100 ml. Leucocytes, 8,600/c.mm (neutrophils 61%, monocytes 6%, lymphocytes 33%

TABLE I. EXCRETION OF 17-KETOSTEROID AND 17-HYDROXYCORTICOSTEROIDS

Date 1953	Treatment	17-*KS** (*N* 6-14)	17-*OH-CS** (30) (*N* 4·9 - 12·3)	*Total* 17-*OH-CS** (31) (*N* 6-17)
24 Jan.		49·3		
7 Feb.		25·2		
8 Feb.		23·5		
20 Apr.		33·0		
21 Apr.		33·0		
29 May	1st operation			
13 Sep.		20·0		
14 Sep.		19·9		
1958				
		51·0	8·8	36·0
	ACTH gel 40 mg./day × 3 days	50·0	8·8	38·4
	Ditto	51·0	14·6	46·5
	Ditto	51·0	17·5	46·0
	Triamcinolone 40 mg./day × 3 days	73·0	13·3	51·0
14 Aug.	2nd operation			
16 Aug.	ACTH gel 40 mg./day	28·0	32·4	74·0
12 Sep.		9·7	14·7	23·4
12 Dec.		11·0	5·4	16·7

*Expressed as mg. per 24 hours. N = normal.

eosinophils 0%, basophils 0%). Blood sugar—fasting, 70 mg./100 ml.; after 50 g. of glucose by mouth, 72 mg. in 90 min. Serum protein-bound iodine, 3 gamma/100 ml. Blood urea, 32 mg./100 ml. Serum potassium, 4·4 mEq./litre. Serum sodium, 135 mEq./litre. Plasma chlorides, 93 mEq./litre, serum CO_2, 27·3 mEq./litre.

On X-ray examination the bony skeleton did not show any abnormality.

On retroperitoneal air insufflation the left kidney was found to be depressed by a large rounded suprarenal mass (Figs. 1 and 2). The upper portion of the stomach was displaced forward by the mass, which on tomography was seen to be contiguous with the upper border of the left kidney. No calcification was seen within the mass. Adequate filling of the right retroperitoneal space was not obtained, but tomography showed an undisplaced right kidney without any apparent mass above it.

The clinical diagnosis of an adrenal virilizing tumour was thus confirmed radiologically and biochemically.

Operation (Prof. D. J. du Plessis). Under 'steroid cover' the adrenal tumour was removed through a translumbar incision. The mass was hemispherical and about 10 cm. in diameter. It was well encapsulated and was easily mobilized, with no evidence of infiltration into surrounding tissues. A transient episode of hypertension (200/150 mm. Hg) occurred during the manipulation of the tumour. Post-operatively there were several episodes of weakness and hypotension, which responded to intravenous cortisol. During this period the patient also received oral cortisone and intramuscular ACTH, from which she was gradually weaned.

Histological examination revealed an adenocarcinoma of the adrenal gland.

Progress. During the months after operation there was a sustained improvement; at the end of the 4th month the abnormal bodily and facial hair, the acne and the 'moon face', had completely disappeared. The menstrual cycle was re-established. Steroid excretion was now normal.

Fig. 1. Retroperitoneal gas insufflation. Lateral film demonstrating suprarenal tumour, which is depressing the kidney and pushing the stomach forwards.

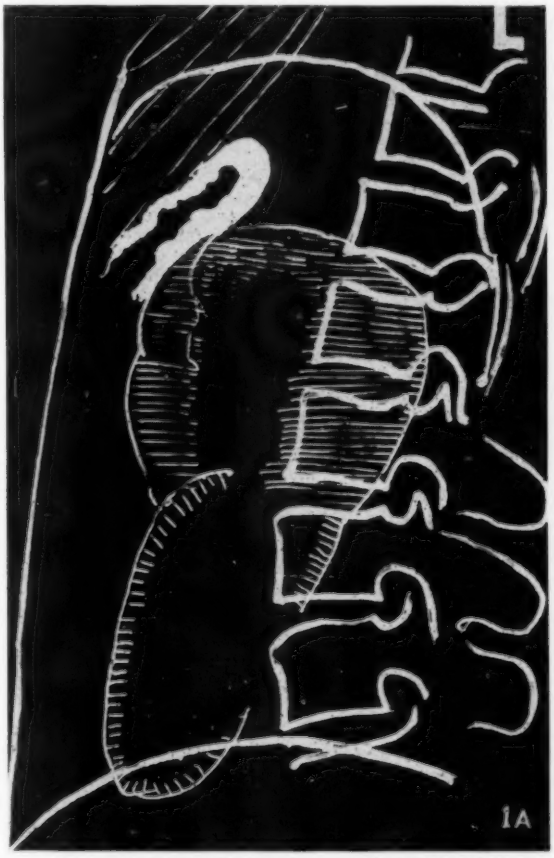

Fig. 1A. Line drawing of Fig. 1 showing the relative positions of tumour, left kidney and stomach.

Fig. 2. Retroperitoneal gas insufflation. Supine tomographic cut showing the tumour and the kidney below it.

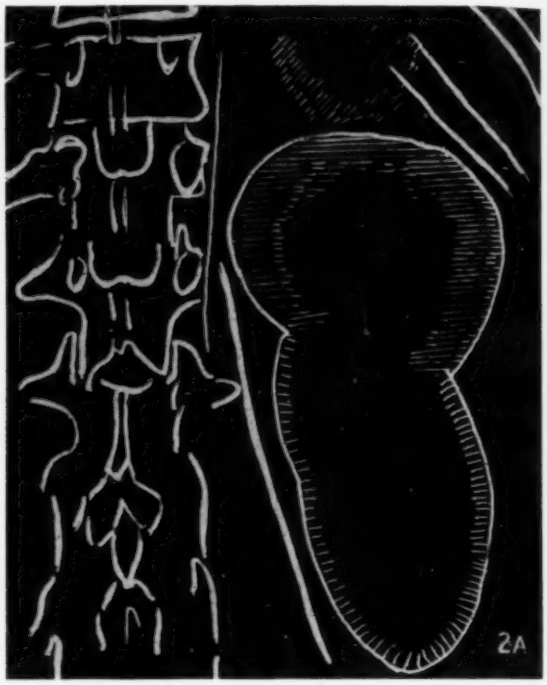

Fig. 2*A*. Line drawing of Fig. 2.

DISCUSSION

The literature indicates the rarity of tumours of the adrenal cortex. Steiner[1] reviewed all the necropsies at the Los Angeles County Hospital from 1918 to 1947 and found that they accounted for 0·2% of all tumours, a total of 15 cases. Heinbecker *et al.*[2] reported 10 of his own cases and added 83 cases from the literature. Rapaport *et al.*[3] reviewed 238 hormonal and 34 non-hormonal tumours reported from 1930 to 1949; of these 72 were androgenic. In Macfarlane's series[4] of 55 cases of adrenal tumours collected from the London teaching hospitals 35 were hormonal.

Only a few reports are to be found of a virilizing tumour of long duration. Macfarlane[4] mentions 2 cases of 13 and 20 years' duration. Escamilla[5] removed an adenoma in a patient who had symptoms for 30 years. In our case there was clinical evidence of virilization for 7 years and biochemical evidence of androgenic activity for 5 years. The sudden exacerbation in symptoms probably heralded the onset of malignant change.

Accurate diagnosis of the aetiology of adrenal malfunction is made possible by the study of adrenal biochemistry and radiology.

Numerous investigators[6-9] have shown that by comparing the response of the adrenal to the administration of ACTH and to 'steroids' one can often differentiate hyperplasia from neoplasm, especially if the latter is malignant.

In our case the high levels of the resting 17-ketosteroids (17-KS) and the normal 17-hydroxycorticoids (17-OH-CS), with no change on stimulation of the adrenal cortex by ACTH nor on depression by triamcinolone, suggested an autonomous androgenic carcinoma. The high level of total 17-OH-CS is a measure of adrenocortical substances that are not derived from hydrocortisone, but are steroids with 17·20-diol and de-oxyketol side-chains, and are commonly found in adrenal virilism.[10]

In the radiological diagnosis of adrenal masses, 3 factors are concerned, namely the direct demonstration of the adrenal, the effect on neighbouring structures and, indirectly, the hormonal influence on bone metabolism and growth.

Many adrenal tumours are visible on abdominal films, especially if calcification is present, which occurs in a large proportion of carcinomata.[11] Presacral gas insufflation, often combined with tomography and intravenous pyelography, is being more frequently used for the investigation of retroperitoneal masses. Anderson[12] showed that this technique had a diagnostic accuracy of approximately 70%. Adequate demonstration of the adrenal may not be obtained owing to abdominal adhesions or infiltration by neoplasm, and occasionally even in the absence of abnormality. The hypertrophied gland, unlike tumours, retains its usual shape but, although criteria of the normal size have been evolved,[13,14] moderate enlargement is difficult to discern. Aortography is useful in demonstrating vascular tumours, but is dangerous if the suspected mass is a phaeochromocytoma.[15] Pyelography may show forward rotation or distortion of the upper calyces of the kidney.

Excessive androgenic excretion causes accelerated development of epiphyses and their early closure, whereas increased glucocorticoid production may cause radiological osteoporosis.

Although menstruation in the presence of an androgenic adrenal carcinoma has been described,[16] there has been no previous report of a successful pregnancy occurring in the presence of an adrenal virilizing tumour. The difficulty in conception and in maintenance of the pregnancy may have been a manifestation of the excessive androgenic activity. In spite of the virilization of the mother the female child showed no similar tendency. It has been shown that foetal intersex of various types can be experimentally produced in animals by the administration of androgens to the mother during pregnancy.[17] Similar effects may inadvertently be produced in the human female by the administration of androgens[18-22] and progesterone,[23-25] although masculinization of the child is not invariable.[26] This latter observation has been confirmed by the birth of a normal female in a case of maternal arrhenoblastoma,[27] as well as in our case of adrenal tumour. However, the presence of maternal arrhenoblastoma has resulted in masculinized infants in 2 recorded instances.[28,29]

SUMMARY

A case of adrenal virilizing tumour of many years' duration is described in a young woman. Late in the course of the disease she became pregnant and gave birth to a normal female infant. Subsequently the tumour underwent malignant change and was removed, with dramatic regression of symptoms and signs.

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THE PASSAGE OF DRUGS ACROSS THE PLACENTA

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A large number of drugs are nowadays available for the treatment of gynaecological, obstetrical and general medical disorders, but relatively little is known with regard to the transmission of therapeutic and toxic agents across the placenta at various stages of gestation and at term. In recent years an increasing amount of research on a scientific basis has been devoted to estimations of the amounts of drugs that reach the foetal blood and tissues and the amniotic fluid; previously the information was based almost entirely on clinical observations of the foetus or the newborn. For many drugs given during pregnancy or labour there is as yet no available information regarding their passage across the placenta and their effects on the foetus. Many statements in the older literature are no longer valid in the light of modern investigations. The whole subject is obviously of great importance in the choice of a drug of therapeutic value to the foetus, or for the avoidance of a drug that may be harmful to the foetus. Drugs, poisons and other noxious substances to which the mother was exposed before or during pregnancy have in certain instances been the cause of foetal malformations; e.g. the congenital malformations caused by rubella virus.

Information on the placental transmission of drugs is scattered in the literature, and a comprehensive account of the available details is obviously very desirable. Consideration has been given in the present article to the transfer of many substances across the placenta and their direct effects on the foetus; untoward effects on the mother have generally not been mentioned, nor has consideration been given to drugs which indirectly improve the prognosis for the foetus by ameliorating the condition of the mother.

Methods of Investigation

Many methods of assay have been used to determine the amount of drug that reaches the foetus after its administration to the mother, including chemical, biological, microbiological, and in recent years the use of radio-active isotopes. Details are given in many of the investigations cited in this article. In addition the following reports are mentioned for reference: A method of collecting placental blood similar to that employed in blood-donor centres is described by Siegel.[173] *In utero* investigation of the placental circulation, maternal and foetal, by means of injections of saline, air and latex is described by Earn and Nicholson.[53] McGaughey *et al.*[135] have studied placental transfer and equilibration in normal and toxic gestation by using antipyrine and sodium and comparing blood samples from the umbilical vein and the intervillous space (obtained by transabdominal aspiration). The comparative physiology of placental transfer based on studies with radio-active sodium is considered by Flexner and Gellhorn.[66] The basic structure of the human placenta with a summary of previous observations on placental structure is described by Hamilton and Boyd.[89] The structure of the placenta of the full-time and immature foetus is

described by Getzowa and Sadowsky[75] and the structure of placentas at various stages of gestation by Shanklin.[172] Attention is also drawn to studies on the histochemical analysis of the human placenta described by Holzaepfel and Barnes[103] and Wislocki and Dempsey.[204] The exchange of various molecules and ions across the isolated amniotic membrane has been studied by Garby.[72]

Placental Function

The placenta is not and can seldom function as a semi-permeable membrane. It appears at times to have a highly selective action. It is an incessantly active 'barrier', and the transfer of different kinds of substances depends upon the cytological and cytochemical structures of the organ as well as on simple diffusion and filtration. With certain exceptions, substances of small molecular weight under 1,000 such as oxygen, carbon dioxide, and perhaps glucose, pass through the placenta in either direction by simple diffusion, and tend to assume equal concentrations on both sides of the placenta. Substances of higher molecular weight either do not pass at all (e.g. sucrose) or are transferred in some special way in which numerous enzymes appear to be concerned.

Certain substances may also pass from the foetus to the mother (*diaplacental passage*), and Leinziger[126] has demonstrated that contrast material may pass from the placenta into the maternal circulation (see also below *re* foetal blood).

The constituents of the human foetus are derived from two sources, viz. transplacental absorption from the maternal circulation, and synthesis in the foetal tissues.[78] The mechanisms of transfer include the following:[106]

1. A pumping action of the placenta, serving as a foetal pump or accessory foetal heart by virtue of its smooth muscle fibres, causing fluids to flow to and from the foetus;

2. A pumping action of the uterus pushing fluids towards the decidual-placental junction, i.e. towards the foetal circulation;

3. A biochemical enzymatic 'pumping' system, with possibly adrenocortical hormones in the maternal circulation playing a role. Then also the trophoblastic epithelium with its cells and enzymes varying in function at various stages of gestation allows diffusion of certain substances and is highly selective in regard to others. A list of the enzymes of the human placenta is given by Page.[35]

A tentative classification of transport mechanisms across the human placenta, based on the primary physiological significance of the substance transferred, relative rates of transfer, and mechanisms of transport and distribution, has been proposed by Page.[147]

The functional role of the placenta, transport, and the comparative anatomy and histology, were discussed at a Conference on Gestation.[35]

PHYSIOLOGICAL ASPECTS

The physiological function of the placenta is to permit the exchange of respiratory gases, nutrients, electrolytes, and water for foetal growth. These substances and others must cross the barrier consisting anatomically of 3 layers: trophoblastic epithelium, chorionic connective tissue, and foetal endothelial capillary lining.

Fructose injected intravenously in women at the end of pregnancy raises both foetal and maternal blood glucose, but intravenous glucose raises the foetal fructose very little.

Calcium utilization by the foetus is influenced by the vitamin-D intake of the mother, so that it is recommended that vitamin D and calcium should be administered in normal pregnancy. The developing foetus uses the dietary calcium of the mother about 5·1 times more than the dietary strontium.[34]

Fat appears to pass through the placenta to the foetal circulation. *Phospholipids* marked with ^{32}P and injected into the circulation of pregnant rabbits are taken up in large amounts by the placenta but they are not transmitted to the foetus.[16]

Amino acids injected into the mother increase the concentration in the foetal blood, which is at all times slightly higher than that of the mother. This is attributed to activity of the trophoblastic epithelium rather than the foetus.[136] There appears therefore to be an active transport mechanism for amino acids across the placenta. In healthy pregnant women at or near term it has been found that both unnatural D-histidine and natural L-histidine given intravenously cross the placenta by simple diffusion but the natural isomer, which crosses more rapidly, is assisted by an additional active transport mechanism.[146]

Radio-active isotopes, e.g. radio-active inorganic salts, have been used to study placental function and transmission, but need to be applied with caution. Pohl and Flexner[154] appear to have been the first to explore this field of investigation.

Radio-sodium is exchanged rapidly and always in excess of the metabolic demands of the foetus. It has been demonstrated that the permeability of the human placenta increases with gestation, the rate for sodium at 36 weeks being 70 times that at 9 weeks.[65,194] These studies as well as the data on the transference of deuterium oxide (heavy water)[97,194] have made it seem likely that the appearance time of radio-sodium in foetal blood is very short and peak concentrations are reached very rapidly—within 2 minutes in human pregnancy at term.[115] The rate of transfer of sodium per unit weight of placenta increases markedly as gestation proceeds.[74] The rate of passage of water and sodium from the maternal circulation to the amniotic fluid indicates, that the water of amniotic fluid is completely replaced, on average, every 2·9 hours, thus revealing that the amniotic fluid is not stagnant; the rate of transfer of water is about 5 times more rapid than that of sodium, indicating that the water is renewed about 5 times as rapidly as sodium.[194] It is of further interest that the exchange of radio-sodium at the placental site continues unimpaired during delivery until placental separation has taken place; thus, regardless of the major alterations in the uterus which accompany its evacuation at delivery, circulation in the intervillous spaces and exchange across the placenta are maintained.

In more recent studies it has been found by tracer methods that the quantity of sodium transferred across the human placenta is, on average, 450 times greater than is needed for the growth increase of the foetus at the particular gestation period.[38]

Radio-active sodium has been utilized for locating the placenta in the intact human uterus, chiefly to determine whether maternal blood can be obtained from the placenta *in situ* by aspiration.[22] Injection of radio-sodium into the mother has provided evidence of the more insidious types of placental ischaemia.[112] The method has also been used as a means of diagnosing foetal death.[31]

Radio-iron studies (see also pharmacological section) have shown that the accumulation of substances in the placental parenchyma is one of the features of foetal-maternal exchange.[193] From studies with radio-active isotopes of iron and phosphorus it was cautiously suggested that occasionally at the end of pregnancy there may be leakage of substances or blood corpuscles across the placenta from mother to foetus and *vice versa*.[145] Criticism, however, was made that such a placental lesion, when once it occurs in cases where the male parent is homozygous Rh-positive, should always recur in every subsequent pregnancy. Recently, by the use of a new technique, which is not dependent on the blood groups of the mother or foetus, it was demonstrated that the transplacental passage of foetal blood to the mother's blood is rather common.[209]

The *copper* content of foetal liver is unusually high, but it diminishes in the nursing period. The concentration in the liver at birth is 4-10 times higher than in the mother.[160] The ceruloplasmin (copper-globulin) content of the serum of women is elevated during the last trimester of normal pregnancy.[80]

PHARMACOLOGICAL INVESTIGATIONS

DEPRESSANTS OF THE CENTRAL NERVOUS SYSTEM

Alcohol passes through the placenta and can be found in the foetal circulation. The toxicity of alcohol for foetal rats is about the same as for adult rats.[30]

Volatile anaesthetics easily pass the placental barrier and tend to reach the same concentration in the foetal circulation as in the maternal blood. With *ether* the concentration in the blood of infants breathing immediately after birth is definitely less than that of infants with neonatal apnoea, which suggests that ether itself and not apnoea delays the onset of respiration.[80] The passage of ether into the foetus is rapid, and as anaesthesia progresses the foetal concentrations approximate to those of the mother;[52] in experiments on animals the concentration is almost the same in the brain and liver of the foetus as in the placenta, and much lower than in the arterial blood and brain of the mother.

Cyclopropane, like ether, crosses the placenta almost quantitatively. The average depression of infants receiving cyclopropane *via* the mother is said to be significantly greater than with regional or other inhalation anaesthesia.[6]

Nixtrous oxide passes over very readily into the foetal blood stream, where it is found in about 58% of the concentration in maternal blood.[33] Administration to the mother of 90%–10% nitrous oxide and oxygen promptly abolishes foetal respiratory movement, while a mixture of 85-15 has no depressant effects on the foetus for 40 minutes or longer.[80]

In addition to anaesthetic gases and vapours, the barbiturates, paraldehyde, chloral hydrate, morphine, and pethidine are all transferred from mother to foetus.[4] *Chloral hydrate*, administered orally in doses of 1·4 – 3·1 g., is soon demonstrable not only in the maternal but also in the foetal blood stream, and with no ill-effects produced;[20] large doses, however, may kill the foetus *in utero*.[113] After the administration of *paraldehyde* the concentration in the foetal blood is about the same as in the mother's blood.[73] *Tribromo-ethyl alcohol* has been employed in the second stage of labour, but depression of the foetal respiration sometimes occurs and the drug is not advised in obstetrics.

Barbiturates

Barbiturates readily cross the placenta and are distributed throughout the tissues of the foetus, so that doses for the mother should not exceed an amount which will produce sedation during labour. Some obstetricians shun their use because they regard them as liable to depress the foetal respiratory centre like morphine, but others have administered even large doses sufficient to produce basal anaesthesia. Observation of the effect of a barbiturate on the mother may give inadequate evidence of its effect on the child. It is clear, however, that marked depression of the baby's respiratory centre can occur if large doses are given to keep a restless mother quiet.

In experiments on cats, rabbits, and guinea-pigs with relatively large doses of *barbitone* and *amylobarbitone* the concentration of barbiturate in the foetus was found to be much higher than that in the mother's blood, the uterus, the placenta and the amniotic fluid.[47] Complete anaesthesia of pregnant cats with *pentobarbitone* profoundly narcotizes the foetus so that most die within 2 hours. Traces of barbiturate may be demonstrated in the amniotic fluid, placenta and foetus of rabbits receiving hypnotic doses of *barbitone sodium*.[48] Foetal respiration is particularly sensitive to the *thiobarbiturates*, as shown in rabbits, in which a dose that caused 50% decrease in the ventilation rate of the mother reduced the foetal respiratory rate by 85%, and this was not related to hypoxia.[50]

Thiopentone has been found in minimal amounts in the blood of the newborn infant up to 7 minutes after a single injection of the barbiturate, and equilibrium between maternal and foetal blood was reached within 10-12 minutes after the induction of anaesthesia, after which the foetal level was very low.[96] When this thiobarbiturate was administered 4-11 minutes before delivery it depressed the ability of the infant to gain normal adult oxygen saturation; at the end of 1 hour the average saturation was 80%, which was not significantly lower than in infants whose mother received no general anaesthetic.[186] From estimations of the maternal and placental concentrations of thiopentone it was found that 58% was transmitted across the placenta, with the foetal concentration only reaching 28% of the initial peak level attained in the mother;[33] the times of delivery of the infants in relation to the injection of thiopentone are unfortunately not given by these workers. Thiopentone given immediately before delivery by McKechnie and Converse[137] was found to cross the placenta rapidly, and in mixed umbilical-cord blood reached equilibrium with the maternal venous blood in 3 minutes; it was unusual for the babies to show respiratory depression. It has been suggested that thiopentone is distributed from maternal blood to the maternal tissues so rapidly that the actual amount reaching the infant is not enough to produce cerebral depression. On the other hand, Crawford[39] found that there was no appreciable placental barrier to thiopentone. Dundee[51] states that there is a delay of at least 5 minutes in the maximum transmission of barbiturates across the placenta; by the time equilibrium has been reached between maternal and foetal blood levels the peak of concentration of barbiturates in the mother will have passed.

Thioamytal injected intravenously in parturient women was found to be in equilibrium in the maternal and foetal blood within 4-5 minutes, and this equilibrium was maintained for at least 1 hour.[114] *Pentobarbitone sodium* crosses to the foetus almost immediately after intravenous injection in the mother, and reaches 74% of the maternal blood level.[52] *Amylobarbitone* and *phenobarbitone* administered intramuscularly, and *barbitone* orally, during the 4th to 7th months of human pregnancy, were demonstrated by spectrophotometric methods to reach equilibrium in maternal and foetal blood during the first 30 minutes, and the rate of elimination was about the same in mother and foetus.[152] The preparation *vinbarbital* in doses of 0·3 g. caused delay in respiration in the babies.[164]

More evidence is needed to support the view of certain workers that different barbiturates vary in their effects on respiration.

In fatal human poisoning (suicide) the level of barbiturate in the foetal blood was almost twice as high as in the mother's blood, owing to less effective detoxication and elimination.[134]

Bromides given during pregnancy may produce eruptions on the infant's face or body at birth (bromoderma).

Chlorpromazine given orally or intramuscularly for nausea and vomiting and hyperemesis gravidarum in doses up to 50 mg. 3 times daily produced no harmful effects on mother or child;[17] also when given intramuscularly every 4-6 hours during labour, alone or with analgesics and hypnotics, there were no significant effects on the newborn.[118] When given with pethidine and hyoscine in varying proportions to 1,881 patients delivered of 1,887 infants, active resuscitation was required in 2·6%, there was moderate respiratory depression in 11·9%, and 1·6% were stillborn.[128]

'*Trilafon*' given together with tuinal, pethidine, and scopolamine, or alone, in a double-blind study, produced no harmful effects in the child.[90]

Reserpine appears to be transferred to the infant *in utero*.[46] *Rauwolfia* (alseroxylon fraction), 1 mg. combined with amphetamine sulphate 3 times daily, later twice daily, produced no adverse effects on the foetus or the mother.[23]

Analgesics

The peculiar sensitivity of the foetus to the depressant effects of analgesic drugs is recognized and respiratory movements may be abolished in the foetus at a level of analgesia which does not impair maternal respiration.

Morphine readily crosses the placenta and is detectable in the foetus both chemically and by its pharmacological effects. It has caused death of the foetus in utero,[113] and distinct tolerance is found in the newborn of animals habituated to morphine.[161] Morphine has been in the main replaced by pethidine in normal labour because of its depressant effect on the foetal respiratory centre.

Dihydrocodeine given with hyoscine in repeated doses produced analgesic effects comparable to those of pethidine, with little respiratory depression of the baby.[164] One or more injections of 30 mg. subcutaneously, with one dose of 100-200 mg. of seconal orally at the beginning, produced no depressant effect on the foetus *in utero*.[144]

Pethidine has negligible effect on the respiratory centre of the foetus unless large doses are administered late in the second stage of labour. About 60-70% crosses the placenta. Less than 1% of a total dose of 100 or 200 mg. given during labour was found in the urine of the infants.[197] With doses that produce satisfactory analgesia in the mother there is not necessarily significant depression in the newborn baby. The plasma concentration in the infant may vary from 45 to 106% (average 77) of the levels measured

simultaneously in the maternal blood.[5] A mixture of 100 mg. of pethidine, 0·3 mg. of hyoscine and 10 mg. of nalorphine given in divided doses on demand by the patient for relief of pain during labour (the maximum amount of pethidine given was 200 mg.) caused no marked depression in the infants and none died.[91]

Alphaprodine (nisentil), 40 mg. subcutaneously, does not produce serious depression of the foetus, but when administered 5 times at 2-hourly intervals it produces foetal respiratory depression.[88] Doses of 30 mg. or less given subcutaneously caused somewhat less foetal depression than morphine and methadone.[177] This analgesic produces moderate or marked depression of the foetal respiration, varying from 5%[117] to 16%.[156] No foetal deaths have been recorded.

Methadone produces depression of foetal respiration intermediate in degree between that produced by morphine and by pethidine. The subcutaneous injection of 10 mg. caused severe foetal depression.[177]

Levorphanol (dromoran) in analgesic doses depresses and delays the respiration of the newborn infant.[87]

Nalorphine, injected about 10 minutes before delivery, or in the newborn infant, has been used in the prevention and treatment of neonatal depression due to analgesics used for sedation of the mother.[55,56,26,12]

Salicylate readily crosses the placenta. In rabbits and rats it passes into the foetal blood in the same concentration as that in the maternal blood.[110] Abortion and foetal death occur only with doses that are fatal to the mother.

OTHER DRUGS

Stimulants of the Central Nervous System

Caffeine administered in fairly large doses to dogs was found in the foetal blood and liver in as high a concentration as in the maternal tissues.[61] Stieve[185] a Berlin anatomist, found that when small doses of caffeine were given to black rabbits during pregnancy the offspring generally died and anatomical changes were demonstrable in the placenta and in the offspring.[193]

Amiphenazole given intramuscularly to the mother in doses of 30 mg. reduces the depressant effect of morphine on foetal respiration and reduces but does not completely eliminate neonatal apnoea caused by morphine.[102]

Autonomic Drugs

Amphetamine sulphate in 5 mg. doses combined with rauwolfia (alseroxylon fraction) produced no adverse effect on the foetus or the mother.[23]

Hydergine given intravenously produced a small decrease in the foetal heart rate.[179] Orally or sublingually it caused no foetal or maternal complications.[111]

Hydralazine has not been shown to have any effects on the infant.

Neostigmine administered during pregnancy produced no ill-effects on the foetus.[99]

Atropine readily crosses the placenta and enters the foetal circulation.

Ganglion-blocking Agents

These are best avoided during pregnancy because they can cross the placenta and may cause paralysis of the intestine of infants.

Hexamethonium passes freely across the placenta in rabbits and can soon be detected in the liquor.[206,207] The possibility of aspiration of amniotic fluid by the human foetus with harmful effects (ileus) was suggested by Morris.[139] Large doses administered for pregnancy toxaemia may cause ileus or bladder distension in the infant; the bladder and stomach of the newborn should be emptied since the amniotic fluid may have had a high concentration of hexamethonium.[163] Submammary drip infusion given after an intramuscular dose in severe toxaemia caused no apparent harm to the foetus.[13]

Mecamylamine appears to have caused fatal ileus in a premature infant.[3] Because of this danger it is recommended that mecamylamine should never be administered to pregnant women within 48 hours of the onset of labour. Repeated or big doses given to the mother may produce effects on the foetal intestine that may last for many days after birth.

Skeletal Muscle Relaxants

When quaternary ammonium muscle relaxants are present in the maternal blood of animals the foetal blood does not contain paralysing concentrations. Small amounts probably pass through the rabbit placenta but the foetal neuromuscular junction is less sensitive than that of the adult.[207]

Tubocurarine does not appear to cross the placenta in significant amounts.[116,40] Injection into the uterine artery of dogs near term was followed by placental transmission of the drug in non-dangerous amounts; in human babies delivered with the aid of therapeutic doses of the relaxant, clinical curarization was not observed.[150] *Tubadil*, a long-acting tubocurarine preparation, given intramuscularly also produced no ill-effects on mother or child.[198]

Gallamine enters the foetal circulation more readily than tubocurarine. However, in a large series of forceps deliveries and Caesarian sections, 100 mg. caused no depression of the baby.[191] It has been demonstrated in the foetal serum, often in readily detectable and apparently significant amounts.[40] In dogs it crosses the placenta after injection into the uterine artery.[151]

Decamethonium crosses the placenta when given intravenously in large doses just before delivery,[58] but did not do so when it was injected into the uterine artery in dogs.[151]

Suxamethonium was found to cross the placenta by Little *et al.*,[125] but not so by Thesleff.[187] After injection into the uterine artery in dogs it was found to pass through the placenta.[151]

Drugs Acting on the Cardiovascular System

Digitoxin, in radio-labelled form, and possibly its metabolic products, were shown to pass through the placenta of rats and guinea-pigs; on a tissue weight basis the concentration in the foetal heart is higher than in the maternal heart.[146] It would appear that as the gestation period increases there is a corresponding increase in the rate of transfer of digitoxin across the placenta.

Drugs Affecting the Urine

Mersalyl does not pass into the amniotic fluid.[176]

Drugs Acting on Blood Vessels

Ganglion-blocking agents, reserpine, hydralazine and other drugs used in hypertension have already been considered.

Protoveratrine given orally or intravenously in toxaemia of pregnancy produced no foetal death, no pooling of secretions in the respiratory tree, and no respiratory depression.[125]

Antihistaminic Drugs

Promethazine (phenergan) given with pethidine to patients in active labour had no apparent effect on the condition of the babies at birth.[63]

Buclizine hydrochloride given in relatively large doses over a long period for nausea and vomiting of pregnancy was unassociated with foetal, or maternal, complications.[36]

The Respiratory System

Carbon dioxide 7·5% in oxygen has little or no effect on foetal respiration, in contrast to marked stimulation produced in the mother.

Carbon monoxide was not found in the foetus in fatal poisoning of a pregnant woman; the mother's blood was cherry-red in colour but the blood of the foetus was dark in colour and contained no carboxyhaemoglobin. These findings were adduced as an indication that there is no transfer of red blood corpuscles across the intact placenta, since CO is fixed in the red cells.[131] Caesarian section might therefore be advisable to save a foetus near term. However, in an analysis of the literature Curtis *et al.*,[42] found that most authors have reported actual passage of CO from maternal to foetal circulation, with several foetal deaths, but some authors have stated that this does not occur. Recently Friberg *et al.*[70] demonstrated that CO is transmitted, slowly, from maternal to foetal blood. In animal experiments it has been found that the percentage saturation of foetal haemoglobin with CO depends on the percentage saturation of the mother's haemoglobin and the length of exposure to the gas.

Salts

Magnesium sulphate injected intravenously and intramuscularly in toxaemia of pregnancy produced no signs of significant foetal depression although the degree of hypermagnesaemia in the foetus closely paralleled that in the mother.[158]

Sodium fluoride passes freely across the placenta to the foetus[142,94] but, while high concentrations in the mother mean high blood levels in the baby, this is not in direct proportion. This has also

been demonstrated in mice and, in the newborn mice, abnormalities were observed in the jaw bones, enamel, and dental pulp.[64] The possibility that fluorine may cause mitotic disturbances and teratism in the foetus is emphasized by Steyn.[184] Many workers believe that the ingestion of fluoride by the mother during pregnancy has no effect on the newborn child since it is only available in small amount to the foetus, and some regard its deliberate administration during pregnancy and lactation as beneficial in reducing the incidence of caries in the child.

Drugs Acting on the Blood and Blood-forming Tissues

Cyanocobalamin crosses the placenta from mother to foetus.[60,130,166] Attempts to influence foetal blood formation by the administration of liver extract during pregnancy have not been successful; this is not surprising since in pernicious anaemia the administration of the haematinic principle in excess of the amount necessary to produce a maximum response brings about no added effect. Cyanocobalamin and folic acid in the mother's serum decrease during pregnancy, owing presumably to their transfer to the foetus.[8] In some cases the serum levels in the infant at birth are more than 4 times as high as in the mother.

Iron is transferred from mother to foetus in considerable amounts during pregnancy, 400 mg. to the foetus and 150 mg. to the placenta, and large iron reserves protect the new born infant against anaemia for a time if it is kept on a milk diet.[108] The concentration of foetal serum iron at birth is almost double that in the mother's serum. The transport of iron across the placenta in rabbits has been studied by Bothwell *et al.*[21] Potassium ferrocyanide or iron ammonium citrate injected into the mother does not pass into the foetus, but with simultaneous administration of ascorbic acid the ferric citrate is enabled to pass.[170] Saccharated iron oxide injected intravenously is rapidly transferred to the foetus and converted into physiological iron compounds.[157]

Radio-active iron given orally in a single dose to pregnant women near the end of gestation appears in the foetal circulation within 40 minutes. It becomes widely disseminated in the foetal tissues, with the highest concentration in the red blood corpuscles and the largest quantity in the liver.[155] Red cells tagged with radio-iron and injected into pregnant women produced significant amounts of radio-activity in the blood of the foetuses in 25 out of 29 patients.[138] Other investigations with radio-iron are considered in the section dealing with physiological studies.

In women, red blood corpuscles have been shown to cross the placenta from foetus to mother[209] (see above); and sickle-trait cells have been shown experimentally to cross the placenta to the foetal circulation in a small percentage of subjects.[132]

Dicoumarol has been given to women before, during and after labour, with beneficial effect on phlebothrombosis, thrombophlebitis, and pulmonary embolism; prothrombin estimations are then absolutely essential. The anticoagulant crosses the placenta and may produce harmful effects on the foetus; cerebral haemorrhage may occur in the newborn infant. Intra-uterine death from haemorrhage occurred in one foetus on the 53rd hospital day, and it was delivered stillborn and macerated on the 74th day.[165] In pregnant rabbits large doses caused death of the foetuses *in utero*; although 'safe' prothrombin levels were maintained in the mother the prothrombin activity was found to be markedly decreased in the infant rabbits at birth.[124]

Drugs from Endocrine Glands

Oestrogens and *androgens* given in large doses to women in early pregnancy appear to produce no adverse effect on the foetal reproductive system.[45] However, when large doses of oestrogens are given to pregnant rats they produce feminized male offspring.[83] and androgens cause the production of masculinized female offspring.[82]

Cortisone was given by Wells[200] for hyperemesis gravidarum and 24 out of 27 infants were apparently normal at birth, but 3 had abnormalities (coarctation, club foot, undescended testes), and another baby was later found to have cataract in one eye. Katzenstein and Morris[119] could find no evidence of damage to a baby from cortisone and corticotrophin therapy given to the mother. They also cite reports of other cases where steroid therapy in pregnant women produced no damage in the babies. On the other hand it has been demonstrated experimentally that cortisone and corticotrophin may damage the foetus *in utero* in mice[67,68,77,162] and in rabbits.[37]

Thyroid hormone normally crosses the placenta and controls the development of the foetal thyroid gland.[25]

Thyroxine and *tri-iodothyronine* (labelled with ^{131}I) given by injection have been studied in women with regard to their passage from mother to foetus;[143] the concentration of organic ^{131}I in the foetal serum was approximately 1/10th that in the maternal serum. The passage of thyroxine across the placenta in guinea-pigs and rabbits is very slow. The rat placenta is slightly permeable to thyroxine.[104]

Iodine administered during pregnancy for at least the last 4 weeks decreased the incidence of goitre in newborn infants in Switzerland from 38% untreated to 8·4% treated.[201] Hundreds of thousands of pregnant women have taken about 100 μg. of iodide every day without harmful effects on mother or child.[57] Studies with *radio-active iodine* have shown that in the human foetal thyroid localization occurs at the time of appearance of discrete thyroid follicles in the 14th-32nd weeks; concentration of radio-iodine occurs only if the mother is injected after the thyroid follicles develop.[27] The human foetal thyroid can accumulate demonstrable amounts of ^{131}I by the 12th week of gestation.[100] In a case treated with radio-iodine during the 6th month of pregnancy there was no detectable effect on the infant.[28]

Sodium radio-iodide (radio-active iodine) is considered to be contra-indicated in pregnancy and lactation because it crosses the placenta freely and is stored in the foetal thyroid after the 3rd month.

(*Thiouracil* compounds cross the placenta from mother to foetus in animals,[149] leading to thyroid hyperplasia and cretinism in the young; this has also occurred in human pregnancy.[60,140] This drug-induced congenital goitre regresses progressively to normal.[1] Thiouracil compounds can be used effectively for hyperthyroidism in pregnancy, but the procedure is not without risk to the infant.)

Insulin apparently does not cross the human placenta, but investigations are still being made on this problem. The hormone appears to pass across the placenta in the rat at full term, also in rabbits and sheep.[183] *Alloxan*, which has been much used experimentally, is found within one or two minutes in the cord blood of rats following its injection into the mother.[71]

Vitamins

Ascorbic acid is always at a higher level in the foetal plasma than in the maternal plasma. After administration of the vitamin both the foetal and maternal plasma levels rise, followed by a fall, which is slower in the foetal plasma.[10] A detailed report on the placental transfer of ascorbic acid in guinea-pigs and human beings is given by Raiha.[159]

Riboflavine is also in higher concentration in human foetal blood than in the maternal blood. The placenta probably effects the transfer by taking flavin adenine nucleotide from the maternal blood and splitting it to free riboflavine.[131]

Vitamin A and carotene in the foetus are both increased when there is an increase in maternal carotene, but an increase in maternal vitamin A is not followed by a similar response in the foetal circulation.[11] It has been concluded that the principal transfer to the foetus takes place in the form of carotene and the foetal system converts the carotene to vitamin A. A period of several weeks is required for these transplacental changes to occur.

Menaphthone crosses the placenta, and used prophylactically it produces marked reduction in infant mortality and haemorrhages (hypoprothrombinaemia of the newborn).[95]

Alpha-tocopherol concentration in the umbilical venous blood is generally higher than in the maternal blood when the latter tocopherol value is high, and 3-4 times higher than that of the umbilical arterial blood.[7]

Metals

Copper (see above).

Mercurials cross the placenta. Congenital syphilis was at one time treated by mercurial inunction of the mother, and the concentration in the amniotic fluid was found to be 0·2 – 0·6 mg. per litre.[178]

Lead administered to rabbits injured the chorionic epithelium and caused coagulation necrosis and haemorrhages, with death of the foetus.[44] Rats are resistant to this effect. The quantity of lead in the newborn animal (rats, dogs) is proportional to the amount ingested by the mother.[24,141] The exposure of either parent to lead is believed to decrease fertility, probably by interfering with implantation or early development of the zygote.

Lead-mining districts in Europe are stated to have an abnormally high incidence of malformed and defective children.

Arsenic when given intravenously in the form of arsphenamine and neoarsphenamine passes through the human placenta; traces reach the foetus, not by simple diffusion but by some other mechanism, and it is constantly present in the meconium of newborn infants.[54] In rats, arsenic crosses the placenta when arsenic trioxide is included in the diet.[141]

Bismuth passes freely across the placenta to be distributed in the foetal tissues, including the bones. It has also been found in the amniotic fluid of the human foetus.[123] In rabbits the distribution in the tissues is the same as in the adult.[127]

Lithium salts exert a direct toxic effect on embryonic tissue, and reduce the percentage of deliveries in pregnant mice.[15]

Selenium passes through the placenta of animals into the foetus.[175] In stock poisoning the foetus may be born without hoofs. The first evidence of the placental transmission of selenium in human beings was recently reported.[86]

Thallium passes into the foetus.[69]

Boric acid (boron) passes through the rat placenta to the foetus.[105]

Chemotherapeutic Agents

Sulphonamides readily pass through the placenta into the foetal circulation and tissues. The blood levels are 50-90% of those in the maternal blood. The drug appears more slowly in the amniotic fluid than in the foetal blood. Sulphanilamide crosses freely,[180] and so do sulphathiazole and sulphadiazine,[182] and sulphamethoxypyridazine.[208]

As regards toxic effects from sulphonamides the following reports are cited. In rabbits sulphanilamide was found to increase the neonatal mortality[2] and large doses given to rats throughout pregnancy also caused increased mortality.[181] In pregnant mice sulphadiazine and sulphamerazine decrease the number of deliveries.[15] There is evidence of possible injury (anaemia and jaundice) to the human foetus from sulphanilamide therapy,[93] and acute liver atrophy and acute haemolytic anaemia resulted from administration of sulphanilamide to the mother.[76] It has been found that the administration of sulphonamides to rats during the latter part of gestation produces almost complete absence of calcification in the foetus; this is attributed to inhibition of phosphatase.[19] The continued administration of sulphaguanidine to pregnant rats delays the development of the foetus.

There are rarely indications for prolonged administration of sulphonamides during pregnancy. In view of the above findings the continued administration of big doses may be hazardous.

Penicillin injected into the mother is transmitted through the placenta, appearing in significant amounts in the foetal blood, but usually much below that in the maternal blood; the antibiotic is found also in the amniotic fluid. Bacteriostatic levels are reached in the foetal circulation.[98,84,107,205,29] Thus adequate treatment in pregnancy is almost 100% effective in the prevention of congenital syphilis or in curing an already infected foetus *in utero*.[196,171,41] Procaine penicillin and the penicillin ester penethamate hydriodide given intramuscularly during labour cross the placenta and satisfactory cord levels are maintained over a 24-hour period.[14]

Streptomycin passes through the placenta but the concentrations found in the foetal blood and tissues and in the amniotic fluid are 50% or less of the concentration in the maternal plasma.[120,81,29]

Tetracyclines readily enter the foetal circulation in antibacterial concentrations,[29] the levels usually being only ¼ - ¾ of those in the maternal blood. When oxytetracycline (2 g.) is administered during labour some crosses the placenta and is present in cord blood; it appears to have no harmful effects on the newborn.[49] In pregnant rats which ingested chlortetracycline the drug could be demonstrated in foetal tissues.[59]

Chloramphenicol is found in the foetal blood at a level about ¾ that in maternal blood.[168] After the administration of 2 g. orally no toxic reactions occur in mother or infant, and the concentration in foetal cord blood is generally at a therapeutic level.[169,29]

Erythromycin crosses the placenta when a total multiple dose of 0·6 – 1·0 g. is administered within 18 hours of delivery.[122]

Quinine passes through the placenta and may cause congenital blindness and deafness in the offspring from damage to the ganglion cells of the retina or the internal ear. This view has been challenged. It is strange that cases were not reported more frequently in the past. Also to be considered is the fact that the effects of rubella on the foetus have only been appreciated in recent years. In malaria, quinine and more recently introduced compounds have been used to prevent congenital infection which may occur with *P. falciparum* infection of the mother.

Mepacrine crosses the placenta.[80]

Vaccines, Toxins, and Antitoxins

Diphtheria and pertussis and tetanus vaccines injected into pregnant women produce a high titre of antibodies in more than 80% of the mothers and their infants;[32] that is to say, transplacental protection against these diseases can be increased by active immunization of the mother during pregnancy. Diphtheria and tetanus antitoxins pass the placenta and also the immune bodies opposing the viruses of measles, smallpox, mumps, poliomyelitis, and the ordinary upper respiratory infections.

Allergens and antigens, viral as well as others, may cross the placenta. The transplacental passage of important allergens rarely results in clinical manifestations of immediate postnatal hypersensitivity and can seldom if ever be demonstrated by skin tests at the time.[85] The passage of the Rh antigen from foetus to mother and the return of anti-Rh antibodies into the foetus show that unchanged protein is able to cross the placenta. Immunization of an Rh-negative mother with Rh-positive blood produces antibodies that enter the foetal circulation and destroy the foetal cells, and similar phenomena may occur with other antigens (e.g. in ABO incompatibility of the mother and foetus). Glutinins (univalent antibodies) traverse the placenta more readily than agglutinins (bivalent antibodies), as shown in studies on two cases of erythroblastosis foetalis.[202]

The transfer of antibodies from mother to young before and after birth has been studied in many laboratory animals and in women. The transmission may be directly *via* the placenta or *via* the amniotic fluid with selection of gamma globulins occurring at the enterodermal lining of the foetal gut. The transfer of other serum proteins from mother to foetus needs more study. The selective placental transmission of whole homologous serum proteins (albumin and gamma globulin) from mother to foetus has been demonstrated in the near-term rhesus monkey; in this animal the placenta resembles the human placenta very closely in the later stages of pregnancy. The amniotic fluid appears to play an unimportant role in the transfer of these proteins.[9] The placental transfer of albumin is reviewed by Winkler *et al.*,[203] who also report on the placental passage of radio-active iodinated rabbit albumin; this transfer is slow so that protein nutrition of the foetus is dependent rather on the passage of simple amino acids than the transfer of the larger protein fractions.

Drugs used in Neoplastic Diseases

Nitrogen mustard injected into pregnant mice in a single dose at the 10th–12th day of gestation had no apparent effect on the mother but induced profound changes in the foetuses, some being killed and others showing teratological anomalies.[43] In pregnant rats nitrogen mustard has produced foetal abnormalities or foetal resorption.[92]

Urethane has been administered to a woman suffering from chronic myeloid leukaemia; the baby showed no evidence of leukaemia.[109] In pregnant mice this drug may cause less young to be produced per litter[101] and embryos may suffer malformations or death.[174]

Mercaptopurine has been administered in acute leukaemia complicating late pregnancy without producing ill effects in the foetus.[167]

Folic acid antagonists, e.g. aminopterin and methotrexate, seriously interfere with embryogenesis through an action on the embryonic mesenchyme. Decidual tissue and placental tissue are unaffected by doses of the drugs which cause foetal death. These drugs should not be administered during pregnancy.[190] In the human subject 6–12 mg. of aminopterin administered in the first trimester of pregnancy induced foetal death and spontaneous delivery in 10 out of 12 cases. In young foetuses there was depression of haemopoeiesis and necrosis of tissues; in 3 older foetuses malformation of the cranium was present.[189] In a recent series of publications Thiersch[189] has reported on compounds with anti-neoplastic properties which produce lethal effects on rat foetuses *in utero*.

Sodium radio-iodine has been considered above in connection with thyroid disorders. When ^{131}I was administered to a woman with carcinoma of the thyroid the foetus delivered 6 days later

by abdominal hysterotomy was found to contain enough radio-iodine in its thyroid to ensure a dose of at least 80,000 rads.[78]

Strontium (radio-active) passes into the foetus of pregnant rabbits; retention in the mother and foetus is greater when the diet is low in calcium.[121,192,133]

The Hiroshima atomic bomb explosion caused 7 out of 11 children exposed during the first half of intra-uterine life, within 1,200 meters of the bomb hypo-centre, to develop microcephaly with mental retardation. Radiation produced an interruption of pregnancy in a number of cases.[153]

Malignant tumours have been found in 4 instances to have crossed the placenta from mother to foetus—from bronchial carcinoma, from lymphosarcoma, and in 2 cases from melanosarcoma. The presence of tumour tissue in the placenta is rare, but not in the foetus.[199] Metastasis of maternal tumour (carcinoma) to the placenta has been reported, with the babies and the umbilical cords unaffected.[18]

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THE SOUTH AFRICAN MEDICAL AND DENTAL COUNCIL : DIE SUID-AFRIKAANSE GENEESKUNDIGE EN TANDHEELKUNDIGE RAAD

TO ALL MEDICAL PRACTITIONERS REGISTERED IN THE UNION OF SOUTH AFRICA

I am instructed by the Council to direct the attention of all registered medical practitioners to the fact that the Council may take cognizance of the following acts or omissions with a view to disciplinary action under the provisions of Chapter IV of the Medical, Dental and Pharmacy Act, Act No. 13 of 1928, as amended:

(*a*) The acts or omissions prescribed in rule 25 of the rules regarding conduct of which the Council may take cognizance, viz.:

'(1) The performance by medical practioners, except in emergency, of professional acts for the performance of which they are inadequately trained and/or insufficiently experienced.

(2) The performance under improper conditions and surroundings of professional acts, except in emergency.'

(*b*) The use of therapeutic measures (operative or non-operative) for conditions for which such measures cannot be reasonably justified.

In connection with (*b*) above, the Council desires to direct the attention of practitioners to the fact that although this particular act is not specifically mentioned in the 'Rules regarding conduct of which the Council may take cognizance,' the Council may nevertheless take cognizance thereof in terms of the provisions of Section 47 of the Act, and if necessary take disciplinary action.

BY ORDER OF THE COUNCIL.

W. H. Barnard
Registrar.

P.O. Box 205
Pretoria
November 1959

AAN ALLE GENEESHERE GEREGISTREER IN DIE UNIE VAN SUID-AFRIKA

Ek is opgedra deur die Raad om die aandag van alle geregistreerde geneeshere op die feit te vestig dat die Raad kennis mag neem van die volgende handelinge of versuime met die oog op dissiplinêre stappe ingevolge die bepalings van Hoofstuk IV van die Wet op Geneeshere, Tandartse en Aptekers, Wet No. 13 van 1928, soos gewysig:

(*a*) Die handelinge of versuime voorgeskryf in reël 25 van die reëls betreffende gedrag waarvan die Raad kennis kan neem, t.w.:

‚(1) Die verrigting deur geneeshere van professionele handelinge, behalwe in gevalle van nood, waarin hulle onvoldoende opleiding en/of ontoereikende ondervinding het.

(2) Die verrigting van professionele handelinge onder onbehoorlike omstandighede of in 'n onbehoorlike omgewing, behalwe in geval van nood.'

(*b*) Die gebruikmaking van terapeutiese metodes (operatief of nie-operatief) vir toestande waarvoor sodanige metodes nie redelikerwys geregverdig kan word nie.

In verband met (*b*) hierbo, vestig die Raad die aandag van geneeshere daarop dat hoewel hierdie besondere handeling nie spesifiek vermeld word in die ‚Reëls betreffende gedrag waarvan die Raad kennis kan neem' nie, die Raad nogtans kennis daarvan mag neem ingevolge die bepalings van Artikel 47 van die Wet, en indien nodig dissiplinêre stappe kan neem.

IN OPDRAG VAN DIE RAAD.

W. H. Barnard
Registrateur

Posbus 205
Pretoria
November 1959.

PASSING EVENTS : IN DIE VERBYGAAN

Disseminated Sclerosis. A South African research worker is anxious to trace all the known cases of disseminated sclerosis in this country. In order to facilitate this survey all doctors who know of patients with this disease are requested to inform the Editor, *South African Medical Journal*, P.O. Box 643, Cape Town, and the information so obtained will be passed on to the investigator conducting this survey. He will then contact the informant and ask for details about the patient.

* * *

Cape Midland Branch, General Practitioners' Revision Course. The Cape Midland Branch of the Medical Association of South Africa is sponsoring a week-end Revision Course for general practitioners on 20 and 21 February 1960. Ward rounds and lectures will be arranged by senior staff members of the local hospitals, and Prof. J. F. Brock, Professor of Medicine, University of Cape Town, will be the guest lecturer and will also take part in the seminars.

The number of practitioners which can be accepted for the course is limited and applications for admission must be made to the Hon. Secretary, Cape Midland Branch (M.A.S.A.), 69 Cape Road, Port Elizabeth, as soon as possible.

* * *

Breathing Aid for Poliomyelitis Patients. A small type of vacuum cleaner 20-inches long and very cheap, has been adapted into a breathing aid for poliomyelitis patients. Known as the Dustette, it is used in reverse to help polio victims to breathe. The machine collects air and forces it into a plastic tube with a mouthpiece on the end which the patient can hold between his teeth. If he

wants to cut off the air supply all he has to do is bite the mouthpiece. If he wants to breathe, he first allows air to flow through the tube and inflate his lungs. Then he bites the tube, cutting off the air stream and so allowing himself to exhale. With the help of this apparatus, patients who were hitherto unable to move more than a few yards from their beds, can move about freely in wheel chairs and even make long journeys by train. On such an occasion they can take the little Dustette with them for it can be worked from a 12-volt battery.

* * *

Seminar on the Public Health Problems Raised by Tuberculosis in the Child. On 21 - 23 September 1959 the International Children's Centre, with the cooperation of the Turkish League against Tuberculosis and of the European Office of the WHO held, in Istanbul, a seminar on the public health problems raised by tuberculosis in the child. The seminar, which was opened by Prof. Tevfik Saglam, former Rector of the University of Istanbul, and was presided over by Prof. Robert Debré, assembled for 3 days about 100 participants, including professors and associate professors of the Faculties of Medicine of Ankara, Istanbul, Izmir, paediatricians and phthisiologists, former students of ICC courses and some 20 fellows from regions of Europe, Africa and Eastern Mediteranean sponsored by the WHO.

Five reports were presented and discussed at length by the participants. These reports were: Study on the frequency of primary tuberculosis in the child; The protection of children against tuberculosis by means of routine medical supervision; The protection of children against tuberculosis by means of BCG vaccination; The role of drug therapeutics in the control of primary tuberculosis in the child; and The bases of the organization of tuberculosis control in the countries where tuberculosis is highly endemic.

IN MEMORIAM

MICHAEL THOMAS MURPHY WOLFAARD, M.B., CH.B. (KAAPSTAD)

Dr. Harold Hofmeyr, van Kaapstad, skryf: Daar is baie kollegas wat met weemoed sal verneem van die heengaan van dr. Mike Wolfaard, voorheen van Maitland, K.P., in die Volkshospitaal, Kaapstad, na 'n operasie vir fraktuur van die femur op Dinsdag 1 Desember 1959.

Dr. Wolfaard

Met sy heengaan verloor die praktyk een van sy opregste algemene praktisyns. Ryk en arm, Blank en nie-Blank, hooggeplaaste en nederige, oue van dae en jonges, vir hulle almal was hy 'n geliefde geneesheer in wie se oordeel hulle volle vertroue gehad het omdat hulle kon peil trek op sy diagnose, voorskrifte en dienste. Benewens geneesheer was hy ook vriend, onbaatsugtige raadgewer en helper. In tye van droefheid en teenspoed was hy nooit te besig om sy mense te troos en te bemoedig nie.

Die heengaan van dr. Wolfaard laat 'n groot leemte in die professionele sowel as burgerlike lewe van Maitland. Ons diepste meegevoel met sy weduwee en twee dogters.

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

NEW RETINAL CAMERA

VEB Carl Zeiss Jena in introducing the new Jena-made Retinal Camera supply the following information:

The Nordenson-type of Retinal Camera produced by the Jena Zeiss works has been for years of valuable assistance to ophthalmic surgeons for diagnostic and therapeutic as well as for academical instruction purposes. However, the photographs required a relatively long exposure time, which in view of the present-day demand for colour photographs would have to be still longer. For the newly designed camera it was therefore necessary to find a light-source the luminosity of which considerably exceeded that of the former incandescent lamp, since the available luminous surface is restricted by the diameter of the dilated pupil and is not therefore capable of enlargement. On the contrary, the wish has often been expressed that—with the small pupil diameters involved (down to 5½ mm.)—it should be possible to make perfect photographs.

In the new instrument the film is exposed by an electron-flash discharge in a Xenon-maximum pressure lamp. The extremely short flashing period completely eliminates any blurring of the image attributable to the movements of the patient's eye during the exposure. Two pilot-lamps provide adequate illumination for focusing the camera, thus protecting the patient's eye from too long and too excessive an exposure to light. Since the Xenon lamp is not in continuous operation the instrument does not become warm even if used for extended periods.

The radiation of the Xenon-flash is utilized in two directions, i.e., by forming an intermediate image and by double reflection, the light-arc is reproduced in two prisms which are located at the right and left of the entrance pupil of the photographic lens and which project their light into the large ophthalmoscope lens. This, in turn, projects the image of the arc into the patient's pupil.

In the same manner also the entrance pupil of the lens system is projected into the patient's pupil; the image of the entrance pupil covering the central part of the patient's pupil, whilst the two arc images appear laterally in bean-shaped form. The two lateral images are strictly separated from the central part to prevent the light of the images of the light source reflected from the cornea from entering the lens system and from spoiling the picture.

The reflex images produced on the surface of the ophthalmoscope lens are rendered ineffective by a small occluding stop (0·4 mm. in size) in the cemented surface of the lens. This stop was considerably larger in the Nordenson Camera. In highly myopic eyes an image of the occluding stop appears in the centre of the field, but while this is unavoidable, it does not in the majority of cases have any disturbing effect.

During the photographic process, i.e., in the reversed optical path, the retina representing the object is reproduced by the optical system of the eye and of the ophthalmoscope lens. From this intermediate image the lens system projects an image into the focal plane of the eyepiece and, during the exposure (after swinging up the mirror) also into the film plane. A negative lens forming part of the lens system serves for focusing purposes for the different degrees of ametropia. This negative lens can be adjusted in the direction of the axis by means of a button at the right-hand side of the surgeon.

The flash is released by an electrical contact which also causes the lifting of the mirror. This contact is located at the upper end of the control lever on the compound-base and is actuated by the thumb of the left hand which controls the adjusting of the camera relative to the patient's eye. The surgeon is thus free to use both hands for setting and focusing the camera and is accordingly in a position to check the image and the position of the camera up to the moment of exposure, and compensate lateral and depth motions of the eye.

The photographic field coverable in the eye amounts to roughly 28°; thus with a single exposure and with the patient looking in the direct direction both the macular and the papillary region of the retina are embraced. In addition, the viewing direction of the patient can be fixed vertically and laterally by means of a setting device so that also laterally located regions of the retina may be recorded.

By means of a prism attached above the ophthalmoscope lens, the operator can without changing the position of his head,

convince himself continuously whether the two images of the coils of the pilot lamp are properly and sharply projected into the patient's pupil. Since each lamp is provided with a precentred base, no further centring of the Xenon-flash lamp is necessary.

By actuating the contact, the pilot lamps are also switched off and will not light up again until the film has been moved on for a further exposure with the aid of a button at the left of the surgeon. In this way it is possible automatically to prevent double exposures. The flash gun permits a sequence of flashes of less than 10 seconds; it is accommodated next to the instrument table.

All films, even fine-grained 10/10 DIN can be used including Agfa Isopan FF 10/10 DIN. For colour photographs Agfa colour reversal film ultra T 16/10 DIN is suitable, but Agfa colour negative film ultra T 17/10 DIN may also be used.

BOOK REVIEWS : BOEKBESPREKINGS

INTRACARDIAC PRESSURE CURVES

Atlas of Intracardiac Pressure Curves. By Otto Bayer and Hans Helmut Wolter. Pp. xvi + 185. 55 figures. 42 tables. DM 68.00. Stuttgart: Georg Thieme Verlag. 1959.

In the general part of this book a careful analysis has been made of pressure curves, registered with the aid of a capacitance manometer. The normal pressure values and curve patterns in the different parts of the heart and great vessels are very adequately described and illustrated. The atrial pressure curves are particularly well dealt with. It is fortunate that a whole section has been devoted to explaining and describing the artifacts and distortions in recordings, which so often result in misinterpretations.

In the second part abnormal curves are presented and described. Although the changes in contour due to arhythmias are of physiologic interest, they are not of the same clinical value as the characteristic pressure changes in valvular lesions, intracardiac shunts and constrictive pericarditis. One does not quite share with these authors the same confidence in the interpretation of pulmonary wedge pressures.

A large part of the Atlas has been set aside for illustrating tracings of diagnostic importance. Each figure is accompanied by a text giving a description of the important features of each curve and an interpretation of its diagnostic significance. The Atlas has been beautifully printed on paper of excellent quality and reproductions of tracings are superb.

Since cardiac catheterization is now a firmly established diagnostic procedure, a volume such as this will be of great practical value to the many clinics where this investigation is now carried out as a routine. A.J.B.

STUDENTS AID SERIES : MEDICAL TREATMENT

Aids to Medical Treatment. 4th edition. By T. H. Crozier, B.Sc., M.D., D.P.H., F.R.C.P. Pp. 367. 15s. London: Baillière, Tindall and Cox Ltd. 1959.

This, the fourth edition of this member of the Students Aid series, has been brought completely up to date and will continue its purpose in assisting students in current medical therapeutics. In order to reduce the tendency to increase in size, certain special sections like dermatology and dietetics have been omitted from this new edition. A.H.T.

PHYSIOLOGY AND BIOCHEMISTRY

Textbook of Physiology and Biochemistry. 4th edition. By George H. Bell, B.Sc., M.D. (Glasg.), F.R.F.P.S.G., F.R.S.E., J. Norman Davidson, M.D., D.Sc. (Edin.), F.R.F.P.S.G., F.R.I.C., F.R.S.E. and Harold Scarborough, M.B., Ph.D. (Edin.), F.R.C.P.E., M.R.C.P. Pp. xi + 1065. Illustrations. 63s. net + 4s. 2d. postage abroad. Edinburgh and London: E. & S. Livingstone Ltd. 1959.

The first edition of this book appeared in 1950. Thus in 9 years 4 editions have appeared and the first 3 have had to be reprinted. From these facts alone one may judge the value of the book to medical students. The latest edition has been thoroughly revised and large sections of many chapters have been rewritten to include recent advances in physiology and biochemistry. The accounts of glycolysis and the citric-acid cycle, for example, now appear in a separate chapter. Other sections which have been revised include thyroid hormones, blood coagulation, oxidation of fatty acids, and the structure of skeletal muscle. In the chapter on 'some physicochemical considerations' it is suggested that the older and misleading definition of acids and bases should be discarded in favour of the more modern and correct definition according to the Bronsted-Lowry concept. This suggestion is welcome and long overdue.

A number of new illustrations appear, including some in colour. There are many diagrammatic representations and schematic summaries which present with exceptional clarity important aspects of the subject. The selected references at the end of chapters have been brought up to date and are a valuable feature of the book.

A few errors and omissions are noted. In the section on the methods for estimating energy output only a passing reference is made to the Max-Planck respirometer, and the integrating motor pneumotachograph (IMP) is not mentioned at all. The spelling of flavinadenine dinucleotide is not consistent either in the text or in the index. Amino acid should be spelled without the hyphen. The correct value for the energy of hydrolysis of the terminal phosphate band of ATP is 7·5 kcal., not 11,500 cal. An account is given of the biosynthesis of the thyroid hormones but not of the recent work on the biosynthesis of the steroid hormones or of the porphyrins. There is no justification for associating Hogben's name with what is correctly known as the Xenopus pregnancy test.

This new edition of BDS can be heartily recommended to medical and science students. It gives a good and particularly well-balanced introduction to the study of physiology and biochemistry.

H.Z.

INDUSTRIAL HYGIENE

Health in Industry. By Donald Hunter, C.B.E., M.D., F.R.C.P. Pp. 289. 18 plates. 4s. Middlesex: Penguin Books. 1959.

This 'Pelican' book is a well written exposition of industrial hygiene and is not only a very useful handbook for medical practitioners working among industrial populations, but also provides interesting and valuable reading for industrial managers and workers. In 8 chapters the author, within the limits of the space available, gives an up-to-date exposition of the history and legislation of industrial medicine, and discusses the hazards of toxic substances used in industry, and also of dusts. There is a well selected glossary of technical terms at the end of the book. The legislation dealt with is that of Great Britain; but it would, of course, be quite impracticable to discuss the legislation of all other countries. The publication of this book in a form and at a price which would make it widely read is admirable and praiseworthy. A.J.O.

LEPROSY

Leprosy in Theory and Practice. Edited by R. G. Cochrane, M.D., Ch.B. (Glasg.), F.R.C.P. (Lond.), D.T.M. & H. Pp. xv + 407. 189 illustrations. 84s. + 2s. postage. Bristol: John Wright & Sons Ltd. 1959.

Cochrane has gathered together a selection of most able contributors and together they have turned out what undoubtedly will become the standard work on leprosy. The wide ramifications that have developed in the study of leprosy are shown by the wide selection of contributors, all of whom are outstanding workers in their particular fields. Cochrane's own contributions are authoritative, as well they might be since he has been a worker in this field for over 34 years. The chapter by L. F. Badger, of the U.S. Public Health Service, on epidemiology upsets some previously held opinions; in view of the rapid increase of the disease

in Hawaii he states that leprosy cannot be held to be 'feebly contagious'. In the chapter on therapy Cochrane correctly states that 'an entirely new and hopeful outlook towards leprosy can be adopted'. This book should be in the hands of every leprologist. A.R.D.

GYNAECOLOGICAL RADIOGRAPHY

Gynecological Radiography. By Jean Dalsache, M.D. and J. Garcia-Calderon, M.D. With a chapter on *Radiography of the Breast*. By Charles-M. Gros, M.D., and Robert Sigrist, M.D. Pp. xvii + 188. 305 illustrations. $8.00. New York: Paul B. Hoeber, Inc. 1959.

This book is really an atlas of hysterosalpingography, accompanied by an introduction on radiography of the breast. It is made up of over 300 illustrations, mostly of excellent reproductions of radiographs. About half the reproductions are 'positives' and half 'negatives', which should partly satisfy all readers. The collection is imposing and has been amassed over many years and from many contributors. All the variants of the normal—the congenital anomalies and every type of pathology that can be demonstrated by this method—are to be found in this concise book.

In this country salpingography is used almost exclusively to ascertain the state of the tubes in cases of sterility. Not so by the French school; the examples they give here of carcinoma of the cervix and body, of fibroids and polyps, of synechiae, and of tubal and extra-uterine mischief, are very impressive. One gets the feeling that our gynaecologists and radiologists could and should combine to do a lot more in this somewhat neglected field.

The section on mammography, though very interesting and equally well illustrated, is little more than introductory. In this subject very few radiologists have any real experience. So long as surgeons remain satisfied that their sensitive palpation tells them all they need to know about the breast, or can hope to know short of surgery, both surgeons and radiologists will remain ignorant of the potentialities of this method of investigation.

This book should undoubtedly be read and kept for reference purposes by all gynaecologists and radiologists and all those aspiring to these specialities. W.J.L.

MEDICAL TREATMENT

Treatment in Internal Medicine. By Harold Thomas Hyman, M.D. Pp. xiv + 609. 42 figures. 3 colour plates. £5 net. Philadelphia and Montreal: J. B. Lippincott Company. Supplied in South Africa by Pitman Medical Publishing Co. Ltd., London. 1959.

Dr. Hyman set himself a prodigious task in writing this book, which covers a very wide field. Notwithstanding the great amount of information included, economy of space is secured both by the use of tables and by considering infections under the heading of the causative organism without separate descriptions of disease entities. Pneumococcal, gonococcal and meningococcal infections comprise one chapter and on reading it one gains the impression that oral penicillin is recommended for the treatment of pneumococcal meningitis. Subacute bacterial endocarditis is dealt with in a very short paragraph. Amoebic liver abscess does not appear in the index and it would be difficult to treat this condition from the information provided in the 2 pages on amoebiasis. The widespread use of proprietary names seems unfortunate.

Although this volume contains much information it cannot be recommended as a standard source of reference in medical treatment. A.J.W.

NOVOCAIN THERAPY IN OLD AGE

Research on Novocain Therapy in Old Age in English translation. A collection of 7 papers from 'Die Therapiewoche', 1956-1957. By Anna Aslan, M.D., C. M. Bürger, M.D., F. H. Schulz, M.D., U. Köhler, M.D., and E. Mampel, M.D. Pp. 68. Illustrations. $12.50. New York: Consultants Bureau, Inc. 1959.

The contents of the 7 papers in this research bulletin suggest that an amazing discovery has been made. By the intramuscular injection of 'novocain' (5 ml. of a 2% solution at a pH between 3·5 and 4) regenerative and rejuvenating effects are claimed in old people. The injections are given 3 times a week in a series of 12 injections, with a 10-day interval between courses.

The whole body is alleged to be affected in an eutrophic way. Shortly after beginning treatment old people show an increased desire to live, there is increased brightness of the eyes, and improved hearing and vision. Arteriosclerosis is reduced through mobilization of cholesterol in the arterial walls. Hair growth is stimulated, even in alopecia, and hair colour preserved. The development of joint disorders may be prevented. It is also claimed that by administration in other ways 'novocain' prevents the aging process in various systems of the body.

Attempts to slow down the aging process have been recorded from time to time. Steinach ligated the vas deferens, and Voronoff implanted monkey testicular tissue. Bogomoletz used his anti-reticulo-endothelial-cytotoxic serum. Niehans believes that foetal cells can help. Multivitamin therapy has been used, extracts of blood-forming tissues, royal bee jelly, and baths containing bicarbonate of soda. Claims are now made by these continental (especially Rumanians) workers for the rejuvenating effects of 'novocain'. Few scientists in Western medicine will hurriedly accept these claims, and still fewer will pay the high price asked for the 68 pages of this bulletin. N.S.

POORT-HIPERTENSIE

The Pathology and Management of Portal Hypertension. Deur R. Milnes Walker, M.S., F.R.C.S. Pp. vii + 113. 67 illustrasies. 35s. Londen: Edward Arnold (Uitgewers) Bpk. 1959.

Die skrywer gee 'n oorsig van die hele toestand van poort-hipertensie soos wat dit in die afgelope 20 jaar benader is.

Die eerste paar hoofstukke handel oor die anatomie en die fisiologie van die poortstelsel, wat gevolg word deur 'n kliniese oorsig oor hoe hierdie toestand presenteer.

Die res van die boek is gewy aan die benadering van 'n geval met poort-hipertensie en die uiteindelike behandeling waaroor besluit moet word. Operasies soos porta cava anastomose en spleno-renale anastomose word breedvoerig bespreek en met mooi afbeeldings geïllustreer. Die indikasies en kontra-indikasies vir hierdie ingrepe word duidelik gestel.

Die spoedbenadering van 'n geval wat met ernstige esofageale bloeding voordoen, word ook bespreek, en iedere ingreep is helder met tekeninge afgebeeld.

Die skrywer wy 'n hoofstuk aan poortsistemiese neuropatie wat baie goed gestel is, asook 'n hoofstuk wat oor poort-hipertensie by kinders handel.

Die finale hoofstuk handel oor die resultate van 111 gevalle van omleidingsprosedures wat deur die skrywer toegepas is, terwyl die resultate van ander werkers in hierdie veld vergelyk word.

Oor die algemeen is dit 'n goeie monogram vir die nagraadse student in die chirurgie, asook vir die chirurg wat graag hierdie gevalle chirurgies wil behandel. J.J.D.J.

LAPAROSKOPIE EN KULDOSKOPIE

Die Laparoskopie und die Culdoskopie in der Gynäkologie. Von Dr. H. Frangenheim. viii + 70 Seiten. 98 teils mehrfarbige Abbildungen. DM 19.80. Stuttgart: Georg Thieme Verlag. 1959.

Hierdie is 'n waardevolle boekie vir diegene wat belangstel in laparoskopie (peritoneoskopie) en kuldoskopie. Hierdie ondersoekmetodes het ongetwyfeld 'n plek verower in die ginekologie en in sommige lande, veral op die Europese vasteland, word hulle redelik algemeen gebruik. Die voordele en nadele van elk van die twee metodes word bespreek en dr. Frangenheim se ondervinding is gebaseer op 500 endoskopiese ondersoeke wat hy persoonlik gedoen het. Sommige van die instrumente wat gebruik word, word bespreek en 'n goeie beskrywing word gegee van die verskillende tegnieke wat gebruik word.

Die kliniese indikasies en kontra-indikasies word nie oortuigend gestel nie. Van die 500 endoskopië was 190 vir steriliteitsondersoeke en 166 vir moontlike ekstra-uterine swangerskappe. In 'n verdere 42 gevalle is die metode aangewend vir die differensiële diagnose van moontlike ovariale tumore. Of die moontlike waarde van hierdie ondersoekmetode teen die potensiële gevaar van die metode sal opweeg, moet nog bewys word. Daar bestaan geen twyfel dat kuldoskopie en peritoneoskopie altwee 'n duidelike

beeld van die bekkenorgane kan lewer, soos getuig deur die veertigtal uitstekende kleurfotos wat verskillende patologiese toestande in die bekken illustreer.

Dit is jammer dat die skrywer klein operatiewe ingrepe wat deur middel van die endoskoop gedoen kan word, net noem en nie verder bespreek nie. F.G.G.

BIGGER'S BACTERIOLOGY

Bigger's Handbook of Bacteriology. 7th edition. By F. S. Stewart, M.D. (Dublin), F.R.C.P.I. Pp. ix + 611. 92 figures. 37s. 6d. London: Baillière, Tindall and Cox Ltd. 1959.

It is 10 years since the publication of the last edition of this popular text-book on bacteriology, and the present edition has been almost completely recast. The result is a text considerably longer than its predecessors mainly owing to the incorporation of a large section on viruses, which gives a comprehensive account of the more important of those of these agents which affect man. There is a new section on antibiotic agents, which one feels could have been expanded with advantage, particularly to include a more detailed account of the side-effects other than the development of resistence. The new edition is a great improvement on earlier ones and can be recommended for students. K.C.W.

ANATOMY AND DISEASES OF THE HAND

The Hand: Its anatomy and diseases. By John J. Byrne, M.D. Pp. xiv + 384. 166 figures. 80s. Oxford: Blackwell Scientific Publications. 1959.

This book on the hand is an American contribution of a comprehensive nature, dealing with some anatomical and embryological problems and the bacteriological and pathological conditions which occur in the hand. Each section is well considered from the bibliographic angle.

There are many aspects of interest, and a broad field is covered, giving the historical basis and considering the hand from a general point of view, apart from the question of rehabilitation, which is scarcely touched upon. In a book of its scope it is disappointing that no mention is made of fundamental principles of hand function, and no mention at all of fixed claw hand nor of Kanavel's contributions on the subject.

However, the book is of value as a general reference on the problems of the hand, dealing with a wider field than most books on this subject; as such it is a valuable adjunct to the library of any surgeon interested in the hand. W.G.

TUBERCULOSIS

Recent Advances in Respiratory Tuberculosis. 5th edition. By Frederick Heaf, C.M.G., M.A., M.D., F.R.C.P. and N. Lloyd Rusby, M.A., D.M., F.R.C.P. Pp. vii + 284. 6 plates, 14 text-figures. 35s. net. London: J. & A. Churchill Ltd. 1959.

In the preface to this fifth edition the authors state: 'Such have been the developments in almost every branch of the subject that the book has, in fact, been completely rewritten'. This is indeed the case, for the last edition was published 10 years ago.

Two most interesting chapters are devoted to tuberculin and tuberculin testing and BCG vaccination, which summarize present thought on the place of tuberculin and BCG in tuberculosis control. A section on primary tuberculosis discusses possible developments after initial invasion of the host and presents the latest ideas on treatment of this important clinical entity.

Respiratory function studies have been given a section of their own and are discussed with reference to their value in the differential diagnosis of pulmonary dysfunction and the objective evaluation of treatment.

Rehabilitation has been dealt with at some length. It arouses envy in the reader at the completeness of tuberculosis control schemes overseas.

Throughout the book each chapter has extensive references to original work and for those who are interested there is a final chapter dealing with classifications and statistics. J.B.P.

OBSTETRIC AND GYNAECOLOGICAL PRACTICE

British Obstetric and Gynaecological Practice (*Obstetrics*). 2nd edition. Edited by Sir Eardley Holland, M.D. (Lond.), F.R.C.P., F.R.C.S., F.R.C.O.G. and Aleck Bourne, M.A., M.B., B.Ch. (Cantab.), F.R.C.S., F.R.C.O.G. Pp. xiv + 1228. Illustrations. 147s. net. London: William Heinemann Medical Books Ltd. 1959.

The volume here reviewed is that on *Obstetrics* in the second edition, the first having appeared some 5 years ago. An impressive roll of contributors gives expression to the views and teaching of the British school of obstetricians, and the final chapter describes the pattern of British obstetrical practice as it is found today. As is usual in books of this nature, authors tend to overlap in their contributions, but the extensive revision of most chapters of the book has eliminated most of this. The work covers a very wide field; it is thorough, detailed, well documented and well illustrated. A.H.T.

CORRESPONDENCE : BRIEWERUBRIEK

OPERATIVE SURGERY

To the Editor: Thank you for the review appearing in the issue of the *Journal* for 26 December 1959 of the remaining volumes of *Operative Surgery* by Prof. Charles Rob and Mr. Rodney Smith.

Your reviewer expressed his regret that separate volumes were not available and we should like to advise you that this is not now the case. The work has recently been split into specialities and is now available as follows: General surgery (in 4 volumes); orthopaedic and plastic surgery (in 2 volumes); gynaecology and obstetrics; genito-urinary surgery; and eyes, ear, nose and throat, and neurosurgery.

A pamphlet on *Operative Surgery by Specialities* has already been circulated to the profession and detailed brochures are available on application.

A. McAdam
Assistant Manager

Butterworth & Co. (Africa) Ltd.
P.O. Box 792, Durban
31 December 1959

MEDICAL AID SCHEMES

To the Editor: In the issue of the *Journal* for 5 December[1] a medical practitioner signing himself *Had it* saw fit to attack the Civil Service Medical Benefit Association for non-payment of accounts which, presumably, he rendered to members of the Association.

I cannot allow the allegations of this doctor to go unchallenged for he has only himself to blame if his accounts to a member of the Association remain unpaid.

If he will take the trouble to acquaint himself with the rules of procedure laid down in the agreement between the Medical Association of South Africa and approved medical aid societies, he will read the following in Clause 2 of the general preamble to the Tariff of Fees (I presume he has a copy in his possession):

'If payment of an account is not received after two consecutive monthly accounts have been rendered to the member the third monthly account giving the full name and address (home and business if possible) of the member shall be sent direct to the Society concerned bearing the words written prominently in red:

"Two months overdue, please investigate"

'The medical aid societies have undertaken to expedite payment in these cases.'

My Association is second to none in its organization and pays accounts which are properly specified promptly on submission by a member. The Association also investigates promptly complaints which are brought to its notice by medical practitioners.

If the complainant had observed the rules which are laid down for medical aid society and medical practitioner alike he would have saved himself much trouble and have avoided the necessity for rushing into print with allegations against my Association which are quite unjustified.

H. C. Cawood
Chairman

Civil Service Medical Benefit Association
P.O. Box 176, Pretoria
22 December 1959

1. Correspondence (1959): S. Afr. Med. J., **33**, 1050.